Final Examination 2023 – 2024
S.5 Mathematics
Paper 2

Name : _____ ( )

Class : S. 5 _____

Date : 11 June 2024

Time : 11:30 – 12:45 (1 hour and 15 minutes)

Past Paper Revision for 2526 S.5

INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should first write your name, class and class number on this cover page. You should also insert the information required in the spaces provided on the Answer Sheet. Darken the corresponding boxes accordingly if necessary. No extra time will be given for inserting the information or darkening the boxes after the "Time is up" announcement.

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

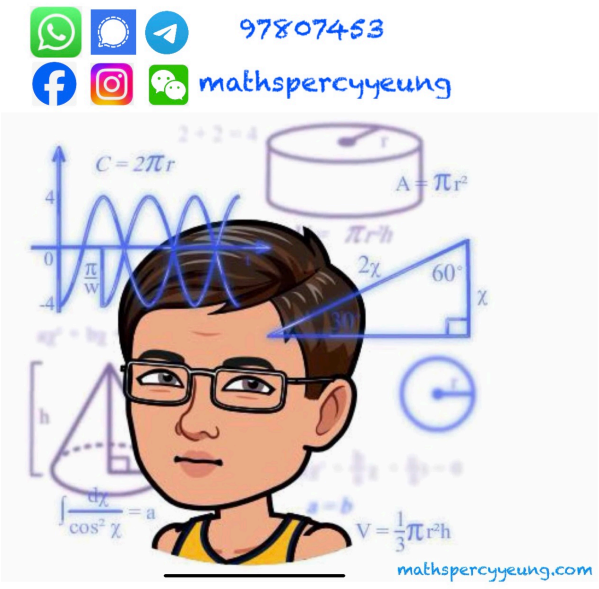
3. All questions carry equal marks.

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.

7. The diagrams in this paper are not necessarily drawn to scale.



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. If $\frac{3}{x}-\frac{2}{y}=7$, then $x=$

A. $\frac{3y}{7y+2}$.

B. $\frac{3y}{2-7y}$.

C. $\frac{2y}{7y+3}$.

D. $\frac{2y}{3-7y}$.

2. $\frac{6^n}{3^{2n}}=$

A. $\frac{1}{2^n}$.

B. $\frac{1}{3^n}$.

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

D. $\frac{3^n}{2^n}$.

3. $\frac{1}{6-5x}-\frac{2}{6+5x}=$

A. $\frac{15x-6}{36-25x^2}$.

B. $\frac{-6}{36-25x^2}$.

C. $\frac{-5x-6}{36-25x^2}$.

D. $\frac{-10x-6}{36-25x^2}$.

4. $a^2+3ab-4b^2+a-b=$

A. $(a-b)(a+4b+1)$.
B. $(a-b)(a-4b+1)$.
C. $(a+b)(a+4b-1)$.
D. $(a+b)(a-4b-1)$.

5. Let k be a constant. Solve the equation $(x+k)(x-5k)=(x-5k)(4k-x)$.

A. $x=-k$
B. $x=5k$
C. $x=-k$ or $x=4k$
D. $x=\frac{3k}{2}$ or $x=5k$

6. If p and q are constants such that $(x+3)(x-p)-10\equiv 4p(x-2)+x(x+q)$, then $q=$

A. –13.
B. –7.
C. 2.
D. 8.

7. The solution of $-x>4$ or $\frac{1+x}{2}>-1$ is

A. $x<-4$.
B. $x>-3$.
C. $-4<x<-3$.
D. $x<-4$ or $x>-3$.

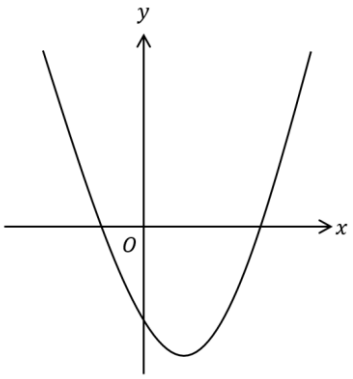
8. It is given that x is a real number. If x is rounded up to 3 significant figures, then the result is 457. Find the range of values of x.

A. $456<x\le 457$
B. $456\le x<457$
C. $456.5\le x<457.5$
D. $456.5<x\le 457.5$

9. If $f(x)=3x-x^2$, then $f(x)-f(x-2)=$

A. 2.
B. $-2x^2+4x+10$.
C. $-4x-2$.
D. $-4x+10$.

10. The figure shows the graph of $y=(mx-n)^2+n$, where m and n are constants. Which of the following is true?



A. $m < 0$ and $n < 0$
B. $m < 0$ and $n > 0$
C. $m > 0$ and $n < 0$
D. $m > 0$ and $n > 0$

11. Let $g(x)=ax^5-bx^3+8$, where a and b are constants. If $g(x)$ is divisible by $x + 3$, find the remainder when $g(x)$ is divided by $x - 3$.

A. 16
B. 8
C. –8
D. –16

12. A sum of \$100 000 is deposited at an interest rate of 4% per annum for 5 years, compounded quarterly. Find the interest correct to the nearest dollar.

A. \$20 404
B. \$21 665
C. \$22 019
D. \$22 100

13. If $2x=3y$ and $2y=3z$, then $x:y:z=$

A. $2:2:3$.
B. $2:3:3$.
C. $4:6:9$.
D. $9:6:4$.

14. It is given that p varies as the square root of q and the cube of r. When $p = -16$ and $q = 16$, $r = 2$ .When $p = -54$ and $r = 3$, $q =$

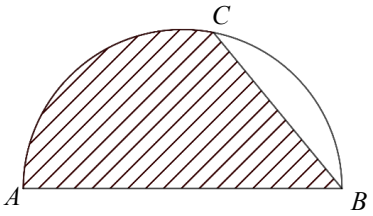
A. -16 .
B. 2 .
C. 4 .
D. 16 .

15. Let a_n be the nth term of a sequence. If $a_6 = 43$, $a_8 = 171$ and $a_{n+2} = 2a_n + a_{n+1}$ for any positive integer n, then $a_5 =$

A. 5.
B. 11.
C. 21.
D. 64.

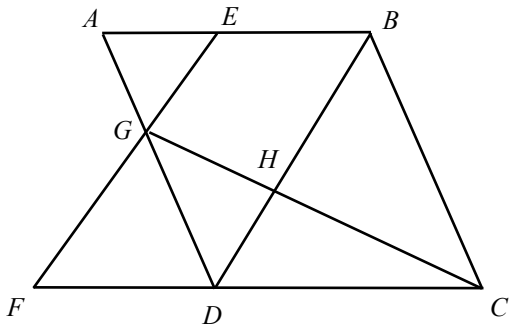
16. In the figure, the diameter of the semicircle ABC is 10 cm. If BC = 5 cm, find the area of the shaded region correct to the nearest cm^2.

A. 35 cm^2
B. 37 cm^2
C. 39 cm^2
D. 41 cm^2



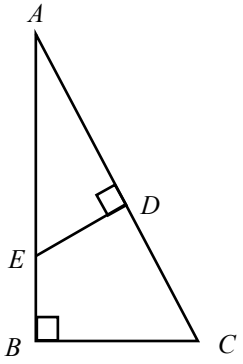
17. In the figure, $ABCD$ is a parallelogram. Let E be a point lying on that AB such that $AE : EB = 2 : 3$. CD is produced to F such that $EB = FD$. Denote the point of intersection of AD and EF by G. It is given that BD and CG intersect at H. If the area of ΔAEG 224 cm^2, then the area of ΔBCH is

A. 525 cm^2.
B. 875 cm^2.
C. 925 cm^2.
D. 1 400 cm^2.



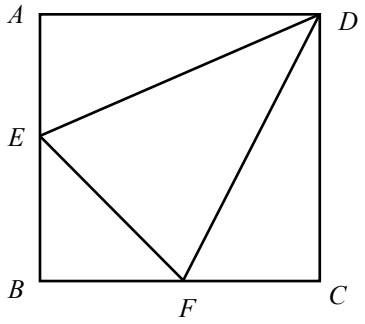
18. In the figure, AEB and ADC are straight lines such that AD = 4, ED : BC = 1 : 2 and BC = CD. Find EB.

A. 5
B. 4
C. 3
D. 2



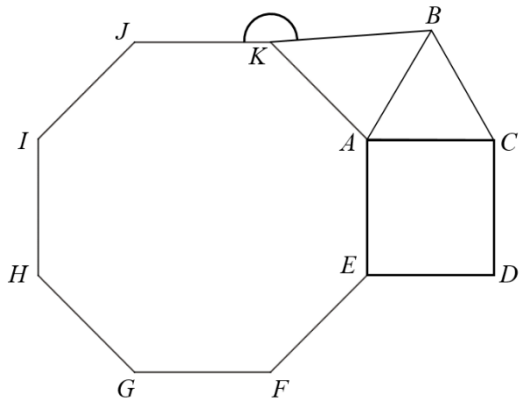
19. In the figure, the area of the square $ABCD$ is 100 cm^2. If $BE = BF$ and the area of ΔDEF is 42 cm^2, then $BE =$

A. 5 cm.
B. 6 cm.
C. 7 cm.
D. 8 cm.



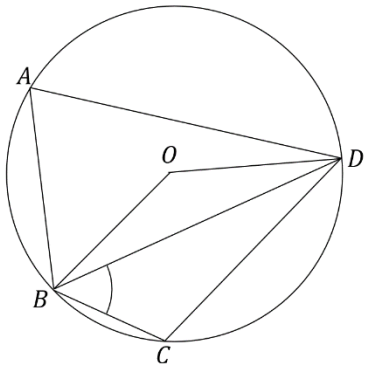
20. The figure shows an equilateral triangle ABC, the square $ACDE$ and the regular 8-sided polygon $AEFGHIJK$. Find $\angle BKJ$.

A. 150°
B. 165°
C. 172.5°
D. 175.5°



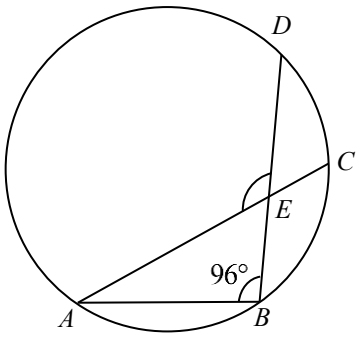
21. In the figure, O is the centre of the circle $ABCD$. If CD // BO and $\angle BAD = 78°$, then $\angle DBC =$

A. 60°.
B. 66°.
C. 72°.
D. 78°.



22. In the figure, $AB = BC = CD$ and $\angle ABD = 96°$. Find $\angle AED$.

A. 116°
B. 124°
C. 128°
D. 132°



23. A ship is 30 km due east of a lighthouse. If the ship moves in the direction N40°W, find the shortest distance between the ship and the lighthouse, correct to the nearest km.

A. 19 km
B. 23 km
C. 25 km
D. 39 km

24. The point $P\ (\sqrt{3},3)$ is translated downwards by 4 units to the point Q. If Q is reflected with respect to the y-axis, then the polar coordinates of its image are

A. $(2,30°)$.
B. $(2,150°)$.
C. $(2,210°)$.
D. $(2,330°)$.

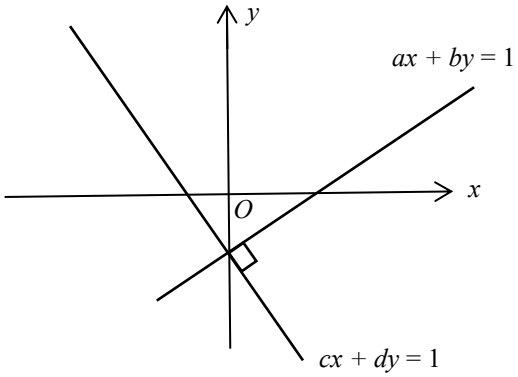
Q.24 – polar coordinates
Out of syllabus

25. Let a be a constant. Find the possible values of a such that the straight lines $3x+\left(\frac{a}{2}\right)y-7=0$ and $4x-(a+2)y+3=0$ are perpendicular to each other.

A. 6
B. $\frac{6}{5}$
C. -4 or 6
D. -6 or 4

26. In the figure, the two perpendicular straight lines intersect at a point on the negative y-axis. Which of the following are true?

I. $b<0$.
II. $a<c$.
III. $d^2+ac=0$.



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

27. The equations of the straight lines L_1 and L_2 are $3x+4y=5$ and $6x-8y=10$ respectively. If P is a moving point on the rectangular coordinate plane such that the perpendicular distance from P to L_1 is equal to the perpendicular distance from P to L_2, then the locus of P is

A. a straight line.
B. a pair of parallel lines.
C. a pair of perpendicular lines.
D. a circle.

28. The equation of circle C is $2x^2+2y^2-20x+16y-7=0$. If the straight line $L: kx+3y+2=0$ cuts C into two equal halves. Find the value of k.

A. 2
B. 2.2
C. 2.6
D. 2.8

29. The mean salary of a group of 30 graduates is \$24 000. If the mean salary of 12 of these 30 graduates is \$30 000, then the mean salary of the remaining 18 graduates is

A. \$18 000.
B. \$20 000.
C. \$22 000.
D. \$22 500.

30. Consider the following positive integers:

$$3 \quad 3 \quad 4 \quad 6 \quad 8 \quad a \quad a \quad b$$

If both the mean and median of the above positive integers are 5, which of the following must be true?

I. The greatest possible range of the above positive integers is 6.
II. There are more than one mode of the above positive integers.
III. The least possible variance of the above positive integers is 2.5.

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

SECTION B

31. The L.C.M. of $4x, 10x^3y^3$ and $12x^4y$ is

A. $4x$.
B. $4xy$.
C. $60x^4y^3$.
D. $60x^8y^4$.

32. $4^3+8^6+16^9+32^{12}=$

A. 100001000040400_{16}.
B. 100001000040040_{16}.
C. 1000000100040040_{16}.
D. 1000001000040040_{16}.

Q.32 – Hexadecimal system
Out of syllabus

33. It is given that $\log_k y$ is a linear function of $\log_{k^2} x$, where $k \neq 0$. If the graph of the linear function passes through $(3,-3)$ and cuts the horizontal axis at 6. Which of the following must be true?

A. $\dfrac{x}{y^2} = k^{12}$

B. $\dfrac{x^2}{y} = k^6$

C. $xy^2 = k^3$

D. $x^2 y = k^6$

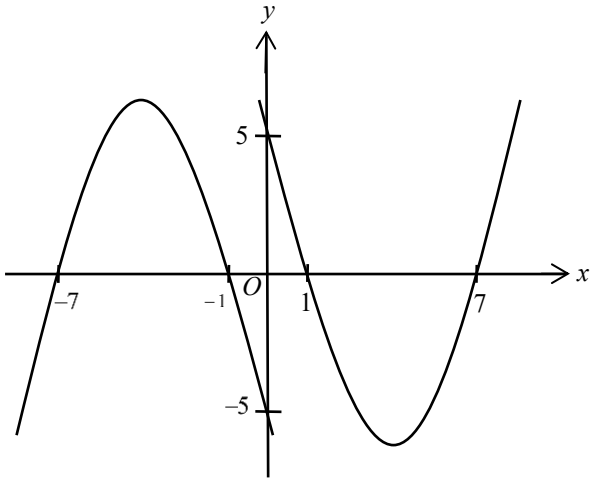
34. Let $z = 6 - ai^{11} + 4ai^{14} + 32i^{16} + 8i^{17}$, where a is a real number. If the real part and the imaginary part are equal, then the imaginary part of z is

A. 8.
B. 10.
C. 14.
D. 18.

35. Let $\mathrm{f}(x)$ be a quadratic function. The figure below represent the graphs of $y = \mathrm{f}(x)$ and $y = \mathrm{g}(x)$. Which of the following is a possible relationship between $\mathrm{f}(x)$ and $\mathrm{g}(x)$?

I. $\mathrm{g}(x) = -\mathrm{f}(-x)$
II. $\mathrm{g}(x) = \mathrm{f}(-x-8)$
III. $\mathrm{g}(x) = -\mathrm{f}(x-8)$

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



36. For $0° \leq x \leq 360°$, how many roots does the equation $3\sin^2 x + \sin x + \cos^2 x = 1$ have?

A. 2
B. 3
C. 4
D. 5

37. Let a_n be the nth term of a geometric sequence. It is given that $a_6 = 234$ and $a_8 = 104$, which of the following must be true?

I. $a_1 > 1700$

II. $\frac{a_5}{a_3} < 1$

III. $a_2 + a_4 + \cdots + a_{2n} < 2222$

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

38. The straight line $hx + ky = 12$ and the circle $x^2 + y^2 - 4x - 10y - 27 = 0$ intersect at the points M and N, where h and k are constants. If the coordinates of the mid-point of MN are (0, 2), find h.

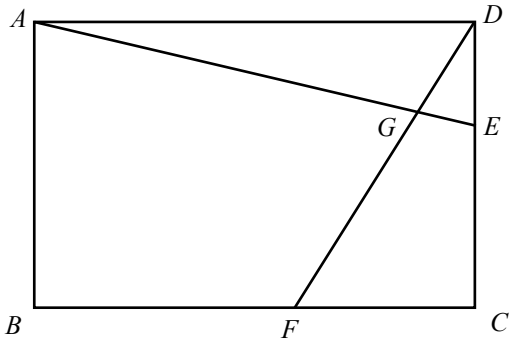
A. 2
B. 4
C. 6
D. 12

39. Let a, b and c be constants where $a > b > c > 1$. On the same rectangular coordinate system, the graph of $y = \log_a x$ and the graph of $y = \log_b x$ cut the straight line $x = c$ at the points P and Q respectively. If the coordinates of R are $(c, 0)$, then $\frac{PR}{QR} =$

A. $\log_a b$.
B. $\log_a c$.
C. $\log_b a$.
D. $\log_b c$.

40. The figure shows the rectangle $ABCD$, where AD = 690 cm and DC = 430 cm. Let E and F be points lying on DC and BC respectively such that DE = 207 cm and FC = 215 cm. Denote the point of intersection of AE and DF by G. Find BG.

A. 481 cm
B. 626 cm
C. 650 cm
D. 720 cm



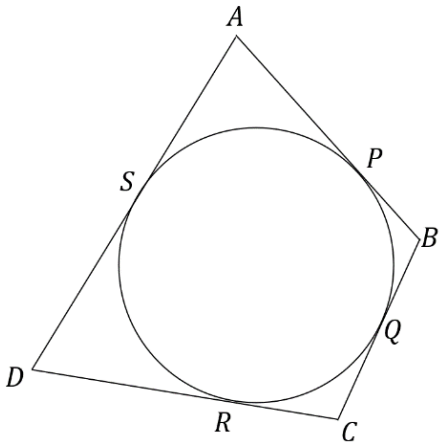
41. The base of the right pyramid $VABC$ is an equilateral triangle ABC. Let θ be the angle between ΔVAB and ΔVBC. If $AB : VB = 6 : 5$, then $\theta =$

A. 60°.
B. 64°.
C. 68°.
D. 77°.

42. In the figure, the circle $PQRS$ is inscribed in the quadrilateral $ABCD$. Which of the following must be true?

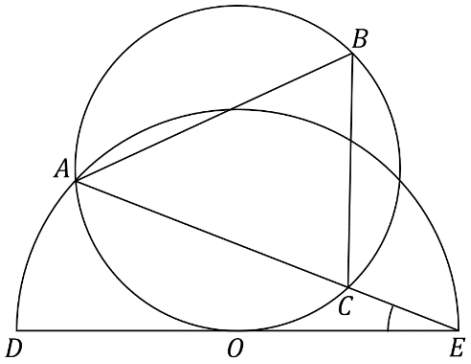
I. $AB + DC = AD + BC$
II. $PR \perp SQ$
III. $AC \perp BD$

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



43. In the figure, DE is the tangent to the circle ABC at O, where O is the centre of the semi-circle DAE. It is given that ACE is a straight line. If $\angle BAE = 66°$ and $AB = AC$, then $\angle AED =$

A. 19°.
B. 20°.
C. 21°.
D. 22°.



44. In a quiz, the median of a class of students is 20 marks and the standard score of Ada is 1.5. The quiz score of each student is adjusted such that each score is decreased by 20% and then extra 5 marks are deducted. Let x marks be the median of the quiz scores of the class of students after the score adjustment. Denote the standard score of Ada after the adjustment by z. Find x and z.

A. $x = 11$ and $z = 1.2$
B. $x = 11$ and $z = 1.5$
C. $x = 16$ and $z = 1.2$
D. $x = 16$ and $z = 1.5$

45. It is given that k is a real number. Let S_1 be a group of numbers $\{k-7, k-4, k-2, k+1, k+3, k+9\}$ and S_2 be another group of numbers $\{k-9, k-3, k-1, k+2, k+4, k+7\}$. Which of the following are true?

I. The means of S_1 and S_2 are equal.

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

III. The variances of S_1 and S_2 are equal.

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

END OF PAPER