97807453

mathspercyyeung

mathspercyyeung.com

2023 − 2024
S5 Second Term Examination

MATHEMATICS Compulsory Part

PAPER 2

14th June, 2024
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. Make a the subject of the formula $\dfrac{r}{a} - \dfrac{s}{b} = 5$.

   A. $a = \dfrac{rb}{5b+s}$.

   B. $a = \dfrac{5+s}{rb}$.

   C. $a = \dfrac{5b+s}{rb}$.

   D. $a = \dfrac{rb}{5b-s}$.

2. $\dfrac{1}{5-2x} - \dfrac{2}{5+2x} =$

   A. $\dfrac{6x+5}{25+4x^2}$.

   B. $\dfrac{2x+5}{25-4x^2}$.

   C. $\dfrac{2x-5}{25-4x^2}$.

   D. $\dfrac{6x-5}{25-4x^2}$.

3. $8^{3-n} \cdot 5^{9-3n} =$

   A. 10^{12-4n}.

   B. 10^{9-3n}.

   C. 40^{12-4n}.

   D. 40^{9-3n}.

4. Factorize $x^2 + xy - 2y^2 - 3x + 3y$.

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

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

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

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

5. If a and b are constants such that $(x+5)(x-a)-4 \equiv (x-3)^2 + b$, then $b =$

   A. -68.

   B. -60.

   C. 4.

   D. 60.

6. The solutions of $4x+7 < 6x-3 < 39$ are

   A. $5 < x < 7$.

   B. $-5 < x < 7$.

   C. $-7 < x < -5$.

   D. $x < 5$ or $x > 7$.

7. If $y = 0.1255$ (correct to 4 significant figures), find the range of values of y.

   A. $0.12545 \le y < 0.12555$

   B. $0.12545 < y \le 0.12555$

   C. $0.1254 \le y < 0.1256$

   D. $0.1254 < y \le 0.1256$

8. If a, b and c are non-zero constants such that $8x^2 + 4ax + 6a \equiv 2x(4x+b) + 4c$, then $a:b:c =$

   A. $2:4:3$.

   B. $3:4:2$.

   C. $4:6:3$.

   D. $6:4:3$.

9. Let $f(x)$ be a polynomial. When $f(x)$ is divided by $x+5$, the remainder is -10. If $f(x)$ is divisible by $x-5$, find the remainder when $f(x)$ is divided by x^2-25.
   A. $x+5$
   B. $x-5$
   C. $5x+1$
   D. $5x-1$

10. The figure shows the graph of $y=(x-h)^2-k$. Which of the following is true?


$y=(x-h)^2-k$
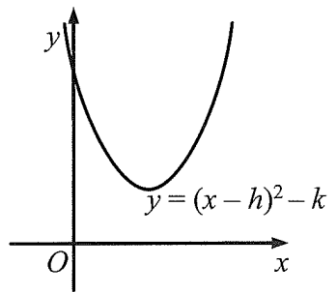
   A. $h>0$ and $k>0$
   B. $h<0$ and $k>0$
   C. $h>0$ and $k<0$
   D. $h<0$ and $k<0$

11. The marked price of a shirt is 25% above its cost. A profit of $40 is made by selling the shirt at a discount of 12% on its marked price. Find the cost of the shirt.
    A. $300
    B. $350
    C. $400
   D. $450

12. The scale of a map is 1: 40 000. If the actual area of a park is 2 km², then the area of the park on the map is
    A. 10 cm².
    B. 12.5 cm².
    C. 16 cm².
    D. 20 cm².

13. It is given that z varies directly as square of x and inversely as square root of y. When $x=3$ and $y=4$, $z=306$. When $x=4$ and $y=64$, $z=$
    A. 17.
    B. 34.
    C. 68.
    D. 136.

14. Suppose x varies directly as y^3 and inversely as z^2. If y is decreased by 10% and z is increased by 50%, then x is decreased by
    A. 20%.
    B. 32.4%.
    C. 67.6%.
    D. 70%.

15. The base radius of a right circular cone is 10 cm. The figure shows a frustum which is made by cutting off the upper part of the circular cone. The radius of the upper base and the height of the frustum are 4 cm and 9 cm respectively. Find the volume of the frustum.
    A. $360\pi\,\text{cm}^3$
    B. $468\pi\,\text{cm}^3$
   C. $492\pi\,\text{cm}^3$
    D. $1404\pi\,\text{cm}^3$
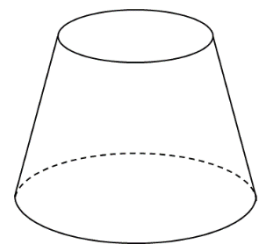
16. The figure shows a rectangle *ABCD* with length 4 cm and width 2 cm. Two semicircles *AEB* and *CFD* are inscribed in the rectangle. Find the shaded region correct to the nearest 0.01 cm².
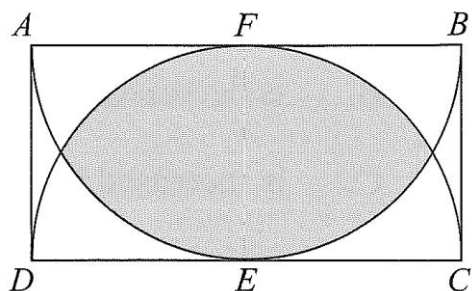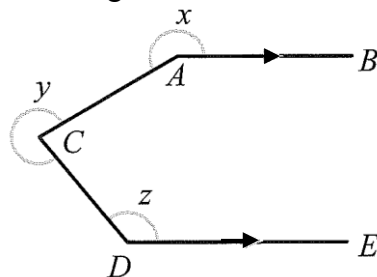

   A.   4.91 cm²

   B.   4.55 cm²

   C.   2.82 cm²

   D.   2.46 cm²

17. In the figure, *ABCD* and *BPDQ* are parallelograms. *P* is a point lying on *AD* such that $AP : PD = 9 : 5$. *AC* cuts *BP* and *DQ* at *R* and *S* respectively. If the area of $\triangle ABR$ is 252 cm², then the area of the quadrilateral *DPRS* is
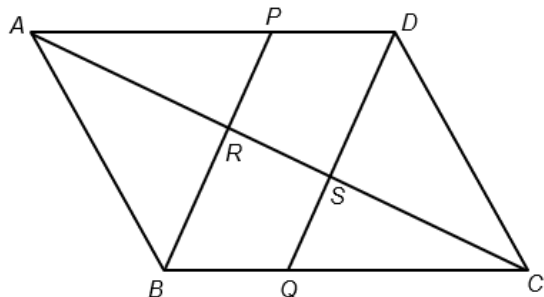
   A.   90 cm² .

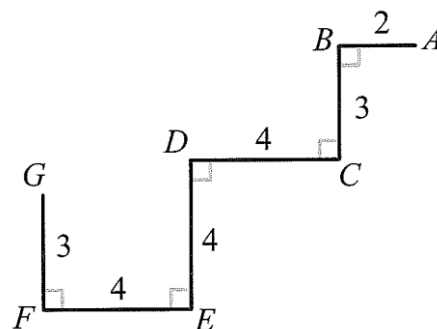   B.   162 cm² .

   C.   180 cm² .

   D.   230 cm² .

18. According to the figure, *AB* // *DE*. Which of the following must be true?

   I. $x + z = 360°$

   II. $x = y$

   III. $x + y - z = 360°$
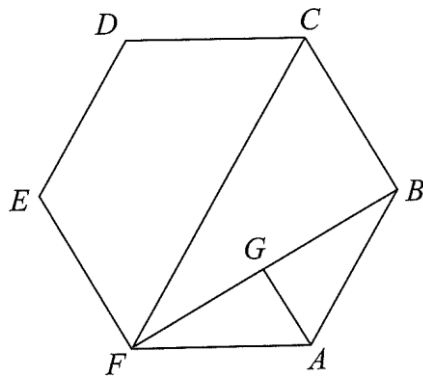
   A.   I only

   B.   III only

   C.   I and III only

   D.   II and III only

19. In the figure, find the length of the line segment joining *A* and *G*.

   A. $\sqrt{116}$
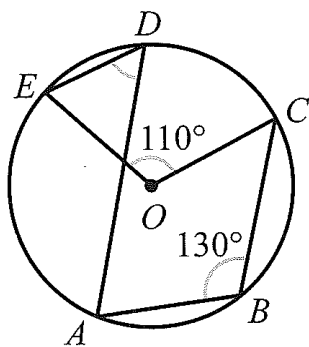
   B.   12

   C. $\sqrt{162}$

   D.   14

20. In the figure, *ABCDEF* is a regular hexagon. *G* is the mid-point of *BF*. Which of the following are true?

    I. $AG \perp BF$

    II. $\triangle ABG \sim \triangle CFB$

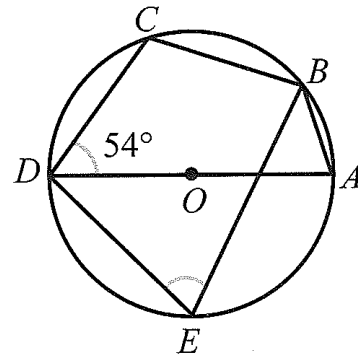   III. $AG : CB = 1 : 2$

    A.   I and II only

    B.   I and III only

    C.   II and III only

    D.   I, II and III

21. In the figure, *A*, *B*, *C*, *D* and *E* are points lying on the circle with centre *O*. If $\angle EOC = 110°$ and $\angle ABC = 130°$, then $\angle ADE =$
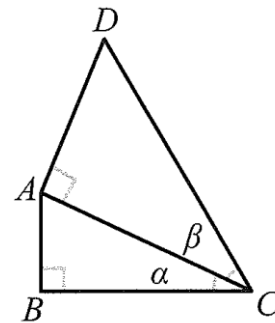

    A. 45°.

    B. 50°.

    C. 60°.

    D. 75°.

22. In the figure, *AD* is a diameter of the circle with centre *O*. If $AB : BC = 1 : 2$, find $\angle BED$.

    A. 64°

    B. 72°

    C. 78°

    D. 84°

23. In the figure, $\dfrac{BC}{AD} =$

    A. $\dfrac{\cos \beta}{\tan \alpha}$.

    B. $\dfrac{\cos \alpha}{\tan \beta}$.

    C. $\dfrac{\tan \alpha}{\cos \beta}$.

    D. $\dfrac{\sin \alpha}{\tan \beta}$.

24. $\dfrac{\cos 0° \sin(270° - \theta)}{\tan^2 45° \cos \theta} + \dfrac{\sin(90° + \theta)}{\cos(360° - \theta)} =$

    A. 0.

    B. 2.

    C. $2 \tan \theta$.

    D. $-\tan \theta$.

25. Find the constant k such that the straight lines $4x-5y-k=0$ and $15x+ky-12=0$ are perpendicular to each other.
    A. -12
    B. -8
    C. 8
    D. 12

26. If a moving point P is always equidistant from two fixed points $A(-2, 1)$ and $B(3, 4)$, find the equation of the locus of P.
    A. $5x-3y+10=0$
    B. $5x-3y-10=0$
    C. $5x+3y+10=0$
    D. $5x+3y-10=0$

27. Which of the following statements about the circle $2x^2+2y^2+8x-12y-24=0$ are true?

    I. The centre of the circle is $(-4, 6)$.
    II. The radius of the circle is 5.
    III. The origin lies inside the circle.

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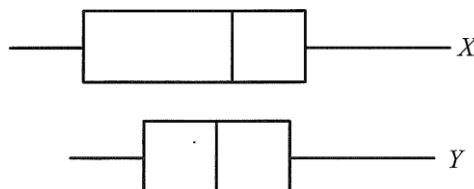   B. I and III only
    C. II and III only
    D. I, II and III

28. The stem-and-leaf diagram shows the distribution of marks of students in a test.

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

A student is randomly selected. Find the probability that the marks of the selected one is more than 62.
    A. 0.8
    B. 0.62
    C. 0.48
    D. 0.44

29. The box-and-whisker diagrams below show the distributions of two data sets X and Y. Which of the following must be true?

    I. Mean of X > Mean of Y
    II. Range of X > Range of Y
    III. Inter-quartile range of X > Inter-quartile range of Y

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

30. Consider the following data

    1 3 5 7 7 10 13 *a* *b* *c*

    where *a*, *b* and *c* are integers with $1 \le a \le b \le c$. If the mean and the range of the above data are 7 and 20 respectively, which of the following is/are true?

        I. $c \le 20$

        II. $b = 2$

        III. $a > 1$

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

Section B

31. In the figure, *A*, *B*, *C* and *D* are points lying on the circle. If *AB* = 12 cm, *AD* = 10 cm and $\angle BCD = 100°$, find *BD* correct to the nearest cm.
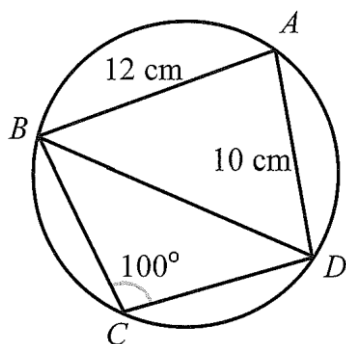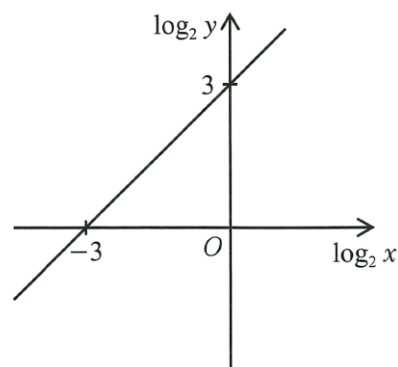

    A. 12 cm
    B. 13 cm
    C. 14 cm
    D. 15 cm

32. The L.C.M. of $15a^2b$, $30b^3c$ and $90a^3c^2$ is

    A. $15a^2bc$.
    B. $60a^2b^3c$.
    C. $90a^3b^3c^2$.
    D. $90a^5b^4c^3$.

33. The graph in the figure shows the linear relation between $\log_2 x$ and $\log_2 y$. Which of the following must be true?

    A. $x - y = -8$
    B. $8x - y = 0$
    C. $8x^3 - y^3 = 0$
    D. $x^3 - y^3 = -8$

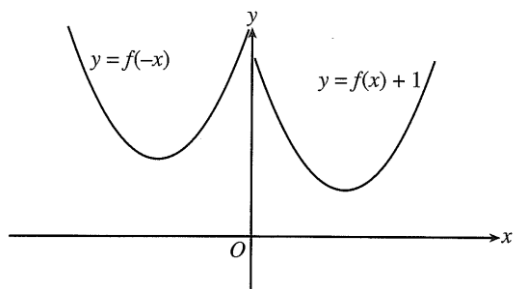34. If *k* is a real number, then the real part of $\dfrac{2+i^6}{k-i} + i^5$ is

    A. $\dfrac{-1}{k^2+1}$.

    B. $\dfrac{k}{k^2+1}$.

    C. $\dfrac{2+k^2}{k^2+1}$.

    D. $\dfrac{1+k^3}{k^2+1}$.

35. Solve the equation $\cos^2\theta + 4\sin\theta = 4$, where $0° \le \theta \le 360°$.

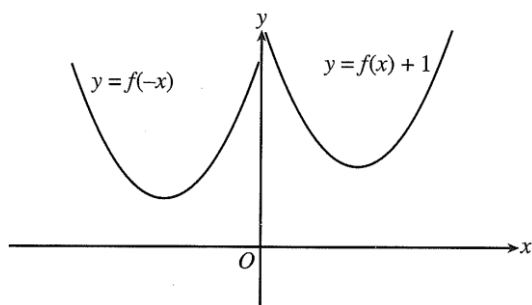   A. $\theta = 45°$ or $135°$
    B. $\theta = 90°$
    C. $\theta = 0°$, $180°$ or $360°$
    D. No solution

36. Which of the following may represent the graph of $y = f(x)+1$ and the graph of $y = f(-x)$ on the same rectangular coordinate system?
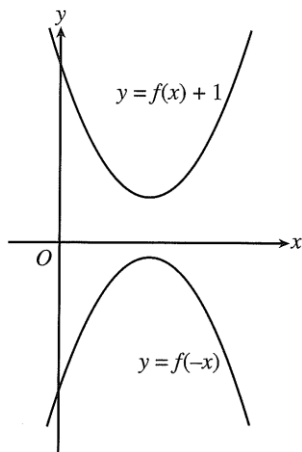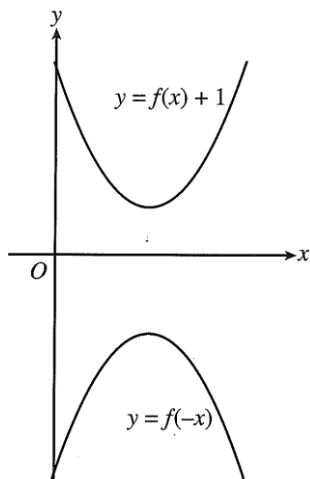
A.

B.

C.

D.

37. Consider the following system of inequalities:

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ x \leq 12 - 2y \\ 2y \leq 20 - 5x \end{cases}$$

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 greatest value of $2x + y + 30$ is

A. 36.

B. 38.

C. 39.

D. 40.

38. In the figure, *FEA* and *FCG* are tangents to the circle *ABCD* at *A* and *C* respectively. *AHC* and *EBHD* are straight lines. *AD* is a diameter of the circle. If $\angle ADH = 22°$ and $\angle AFC = 52°$, then $\angle AHE =$
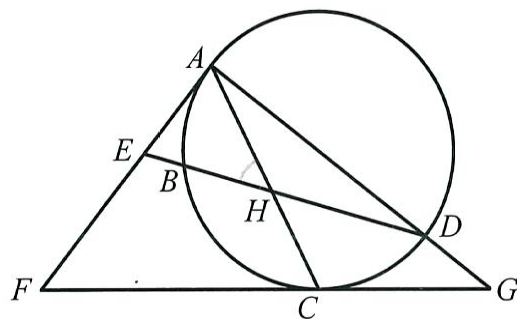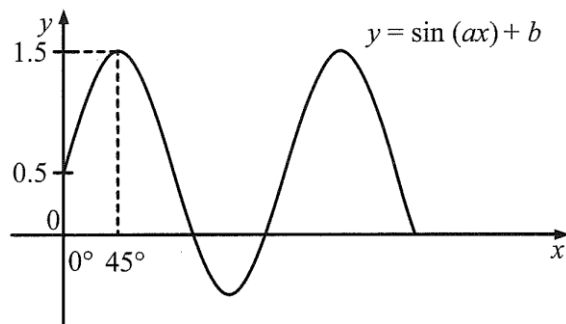

A. 48°.

B. 50°.

C. 52°.

D. 60°.

39. Find the range of values of k such that the straight line $x + y - k = 0$ meets the circle $x^2 + y^2 = 16$.

A. $k < -4\sqrt{2}$ or $k > 4\sqrt{2}$

B. $k \leq -4\sqrt{2}$ or $k \geq 4\sqrt{2}$

C. $-4\sqrt{2} \leq k \leq 4\sqrt{2}$

D. $k \leq 4\sqrt{2}$

40. Let a and b be constants and $0° \leq \theta \leq 360°$. If the figure shows the graph of $y = \sin(ax) + b$, then

A. $a = 0.5$ and $b = -0.5$.
B. $a = 0.5$ and $b = 0.5$.
C. $a = 2$ and $b = -1.5$.
D. $a = 2$ and $b = 0.5$.

41. Let O be the origin. If the coordinates of points A and B are $(8, 0)$ and $(2, 6)$ respectively, then the coordinates of the circumcentre of ΔOAB are

A. $(1, 6)$.
B. $(2, 5)$.
C. $(2, 4)$.
D. $(4, 2)$.

42. There are 10 boys and 20 girls in a class. If 6 students are selected to form a committee of at least 3 girls, then the number of different committees can be formed is

A. 548 625.
B. 509 865.
C. 354 825.
D. 136 800.

43. A bag contains 4 red marbles, 6 blue marbles and 10 green marbles. A marble is drawn one by one from the bag without replacement until a blue marble is drawn. Find the probability that at least three draws are needed.

A. $\dfrac{3}{10}$

B. $\dfrac{7}{20}$

C. $\dfrac{89}{190}$

D. $\dfrac{91}{190}$

44. In a mathematics test, the mean mark is 54 marks. Keith gets 60 marks and his standard score is 2. If Valerie gets 96 marks, then her standard score is

A. 6.
B. 9.
C. 11.
D. 14.

45. A data set has a mean of a, an inter-quartile range of b and a standard deviation of c. If 5 is deducted from each number of the set and then all of them are multiplied by 2 to form a new data set, find the mean, the inter-quartile range and the standard deviation of the new data set.

	Mean	**Inter-quartile range**	**Standard deviation**
A.	a	b	c
B.	$2a - 10$	$2b - 10$	$c - 2$
C.	$2a - 10$	$2b$	$2c$
D.	$2a$	$2b$	$2c$

END OF PAPER