

MOCK EXAM 2
MATHEMATICS Compulsory Part
PAPER 2

(1 $\frac{1}{4}$ hours)

INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet.
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

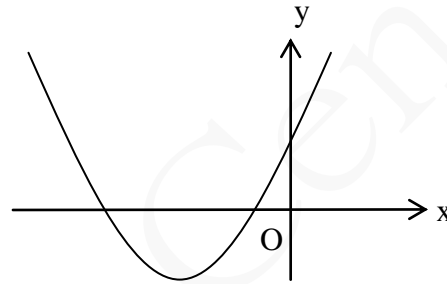
- $(4 \cdot 8^{n+1})^2 =$
 - 2^{6n+8} .
 - 2^{6n+10} .
 - 2^{9n+10} .
 - 2^{9n+12} .
- $(3x + 2y)^2 - (3x - 2y)^2 =$
 - 0.
 - $8y^2$.
 - $12xy$.
 - $24xy$.
- If p and q are constants such that $x^2 - 2x + p \equiv (x - 3)(x + q) - 5$, then $p =$
 - 1.
 - 5.
 - 8.
 - 10.
- Let $f(x) = x^{15} + 3x - k$, where k is a constant. If $f(x)$ is divisible by $x + 1$, find the remainder when $f(x)$ is divided by $x - 1$.
 - 4
 - 0
 - 6
 - 8

5. Let k be a constant. Solve the equation $(2x + k)^2 = 9k^2$.

- A. $x = k$
- B. $x = 2k$
- C. $x = -2k$ or $x = k$
- D. $x = -2k$ or $x = 4k$

6. The figure shows the graph of $y = -a(x + b)^2$, where a and b are constants. Which of the following is true?

- A. $a < 0$ and $b > 0$
- B. $a < 0$ and $b < 0$
- C. $a > 0$ and $b > 0$
- D. $a > 0$ and $b < 0$



7. The solution of $x - \frac{3-x}{4} > 8$ or $2 < x - 8$ is

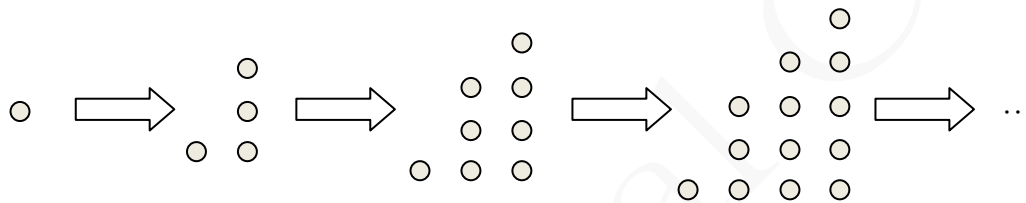
- A. $x > 7$.
- B. $x > 8$.
- C. $x > 9$.
- D. $x > 10$.

8. Shop X sells two digital cameras for \$4 950 each. The shop gains 10% on one and loses 10% on the other. After the two transactions, the shop

- A. has no gain or no loss.
- B. gains \$55.
- C. loses \$55.
- D. loses \$100.

9. In a school, 45% of students are boys. If 60% of the girls wear glasses and 70% of the boys wear glasses, then the percentage of students wearing glasses in the school is
- A. 35.5%
 - B. 46.5%
 - C. 53.5%
 - D. 64.5%
10. It is given that $\frac{2}{3a} = \frac{3}{5b} = \frac{5}{6c}$, where a , b and c are positive numbers. Which of the following is true?
- A. $b < a < c$
 - B. $b < c < a$
 - C. $c < a < b$
 - D. $c < b < a$
11. The height and base of a triangle are measured as 4.4 cm and 5.2 cm correct to the nearest 0.2 cm respectively. Let $x \text{ cm}^2$ be the actual area of the triangle. Find the range of values of x .
- A. $10.965 < x \leq 11.925$
 - B. $10.965 \leq x < 11.925$
 - C. $11.34 < x \leq 11.54$
 - D. $11.34 \leq x < 11.54$
12. The area of a park on a map is 50 cm^2 . If the actual area of the park is 0.08 km^2 , then the scale of the map is
- A. 1 : 1 600.
 - B. 1 : 3 200.
 - C. 1 : 4 000.
 - D. 1 : 16 000 000.

13. It is given that z varies directly as \sqrt{x} and inversely as y . If x is increased by 44% and z is decreased by 4%, then y is
- increased by 25%.
 - increased by 75%.
 - decreased by 40%.
 - decreased by 4.8%.
14. In the figure, the 1st pattern consists of 1 dot. For any positive integer n , the $(n + 1)$ th pattern is formed by adding $n + 2$ dots to the n th pattern. Find the number of dots in the 7th pattern.



- 26
 - 31
 - 33
 - 34
15. In the figure, the two straight lines intersect at a point on the positive x -axis. Which of the following are true?

I. $b > 0$

II. $d > 0$

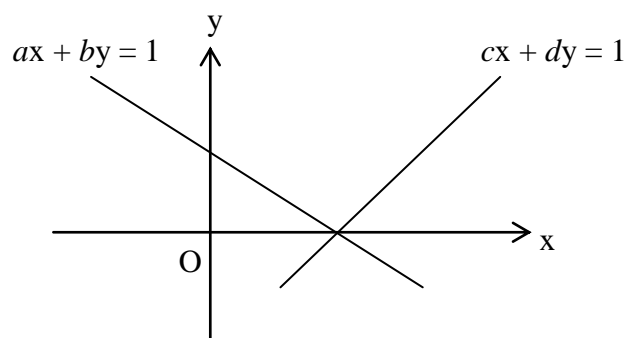
III. $a = c$

A. I and II only

B. I and III only

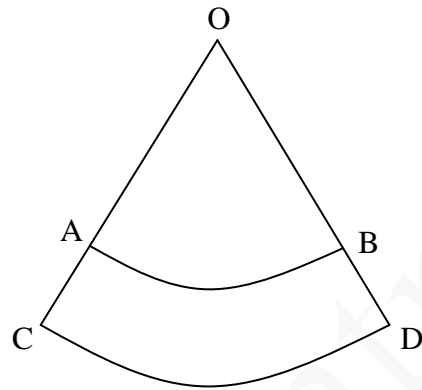
C. II and III only

D. I, II and III



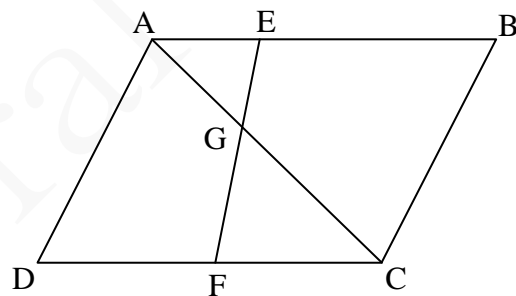
16. In the figure, OAB and OCD are sectors with centre O. If $\widehat{AB} = \frac{3}{4}\widehat{CD}$ and $AC = 4$ cm, then $OC =$

- A. 8 cm.
- B. 12 cm.
- C. 16 cm.
- D. 20 cm.



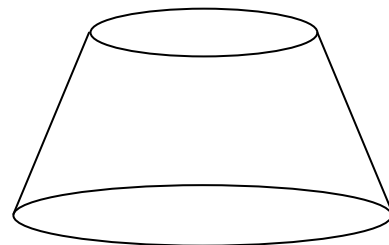
17. In the figure, ABCD is a parallelogram. E and F are points lying on AB and DC respectively such that $AE : EB = 1 : 2$ and $DF : FC = 1 : 1$. If the area of $\triangle AGE$ is 4 cm^2 , then the area of quadrilateral ADFG is

- A. 16 cm^2 .
- B. 18 cm^2 .
- C. 21 cm^2 .
- D. 26 cm^2 .



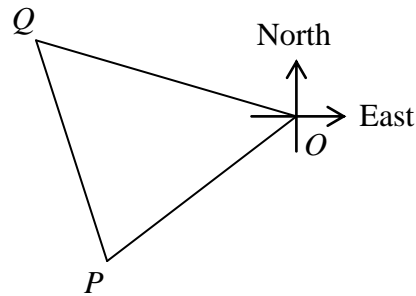
18. In the figure, the frustum is formed by cutting off the upper part of a right circular cone. The radius of the top surface is 3 cm and the radius of the bottom surface is 6 cm. If the height of the frustum is 4 cm, then the total surface area of the frustum is

- A. $54\pi \text{ cm}^2$.
- B. $69\pi \text{ cm}^2$.
- C. $90\pi \text{ cm}^2$.
- D. $105\pi \text{ cm}^2$.



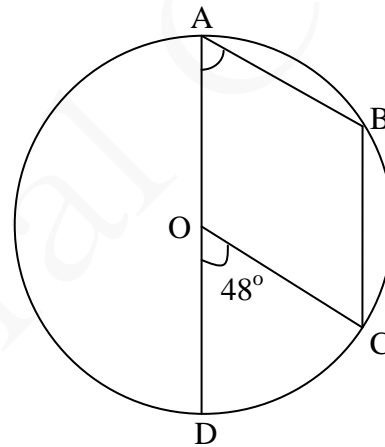
19. In the figure, the bearing of P from O is $S40^\circ W$ and the bearing of Q from O is $N78^\circ W$. If O and Q are equidistant from P, then the bearing of Q from P is

- A. $N16^\circ W$.
- B. $N19^\circ W$.
- C. $S16^\circ E$.
- D. $S19^\circ E$.



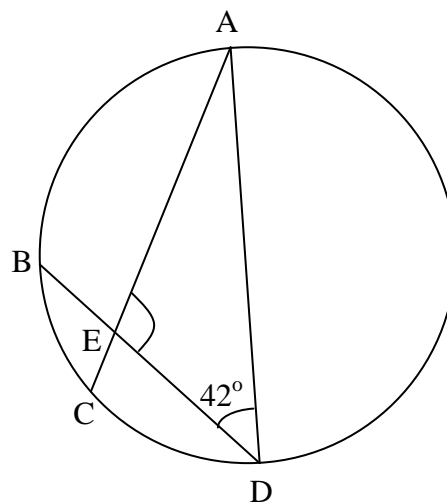
20. In the figure, O is the centre of the circle ABCD. AOD is a diameter of the circle. If $AD \parallel BC$ and $\angle COD = 48^\circ$, then $\angle OAB =$

- A. 24° .
- B. 42° .
- C. 48° .
- D. 66° .



21. In the figure, AD is a diameter of the circle ABCD. If $\widehat{BC} : \widehat{CD} = 1 : 2$ and $\angle ADB = 42^\circ$, $\angle AED =$

- A. 84° .
- B. 96° .
- C. 106° .
- D. 122° .



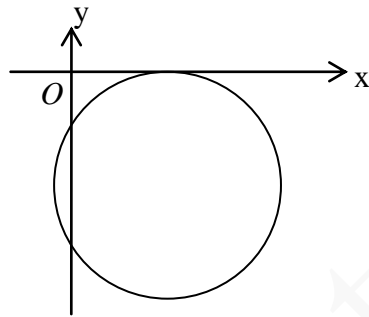
22. If an interior angle of a regular n -sided polygon is greater than an exterior angle by 100° , which of the following is/are true?
- I. The value of n is 9.
 - II. The number of diagonals of the polygon is 9.
 - III. The number of folds of rotational symmetry of the polygon is 9.
- A. I only
 - B. II only
 - C. I and III only
 - D. II and III only
23. If $90^\circ < x < 180^\circ$, which of the following must be true?
- I. $\sin x - \sin(90^\circ - x) > 0$
 - II. $\cos x + \cos(90^\circ - x) < 0$
 - III. $\tan x \tan(90^\circ - x) = 1$
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
24. The coordinates of the points A and B are (1, 2) and (3, -2). Let P be a moving point in the rectangular coordinate plane such that $AP = BP$. Find the equation of the locus of P.
- A. $x - 2y - 2 = 0$
 - B. $x - 2y + 10 = 0$
 - C. $x - 2y + 18 = 0$
 - D. $2x - y - 2 = 0$

25. In the figure, the radius of the circle and the coordinates of the centre are r and (h, k) respectively.

Which of the following are true?

- I. $h + k < 0$
- II. $r + h > 0$
- III. $r + k = 0$

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



26. $\star 7 \bullet \blacklozenge$ is a 4-digit number, where \star , \bullet and \blacklozenge are integers from 0 to 9 inclusive. Find the probability that the 4-digit number is divisible by 5.

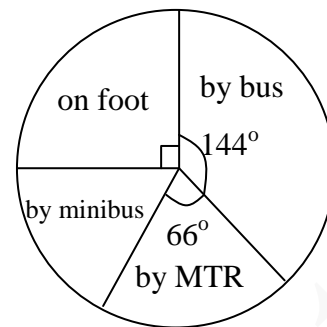
- A. $\frac{1}{5}$
- B. $\frac{11}{15}$
- C. $\frac{10}{333}$
- D. $\frac{29}{1000}$

27. If the mean and the mode of the numbers 5, 9, 6, 4, 5, 8, 7, x , y and z are 7 and 9 respectively, then the median of these numbers is

- A. 6.5.
- B. 7.
- C. 7.5.
- D. 8.

28. The pie chart below shows the distribution of transportation taken by students in a school. There are 360 students taking bus. Find the number of students taking minibus.

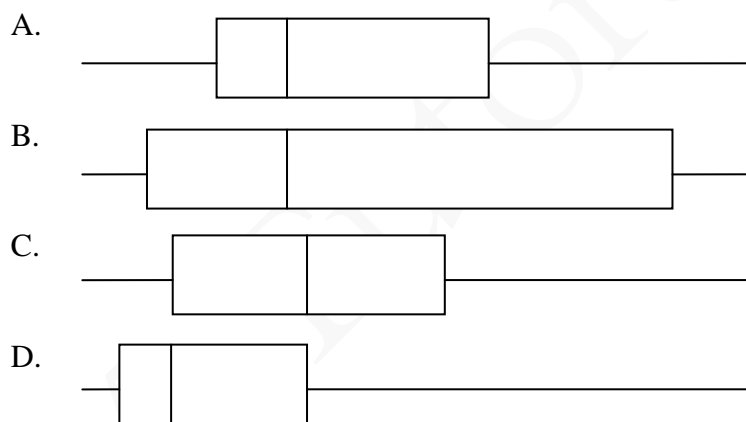
- A. 60
- B. 150
- C. 165
- D. 225



29. The stem-and-leaf diagram below shows the distribution of the number of monthly reading hours of a class of students.

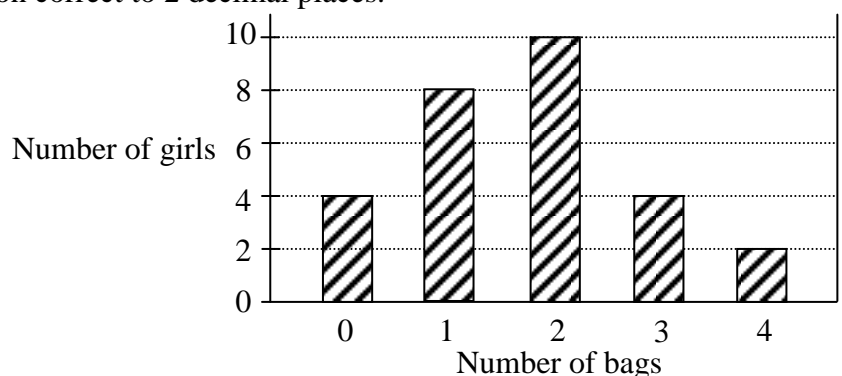
Stem (tens)	Leaf (units)						
0	6	6	7	8	9	9	
1	0	1	2	4	4	8	
2	0	1	1	2	2	3	8
3	0	2	2	3			
4	1	1	3	3	5	6	8

Which of the following box-and-whisker diagrams may represent the distribution of the reading hours?



30. The bar chart below shows the distribution of the number of bags owned by a group of girls. Find the standard deviation of the distribution correct to 2 decimal places.

- A. 0.91
- B. 1.09
- C. 1.10
- D. 3.12

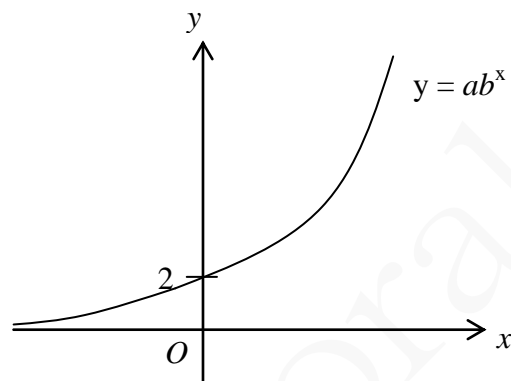


Section B

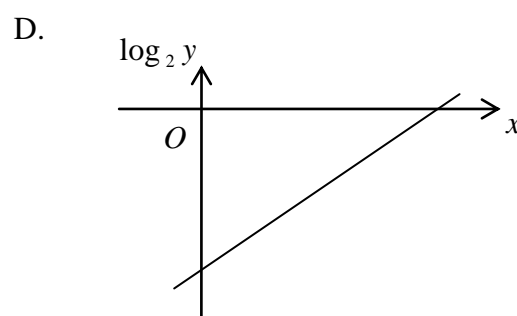
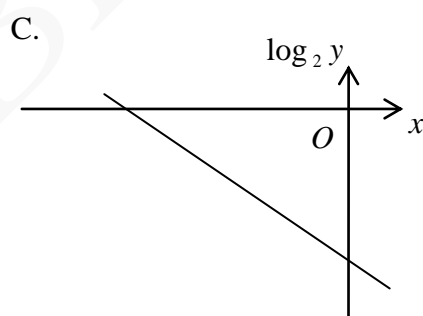
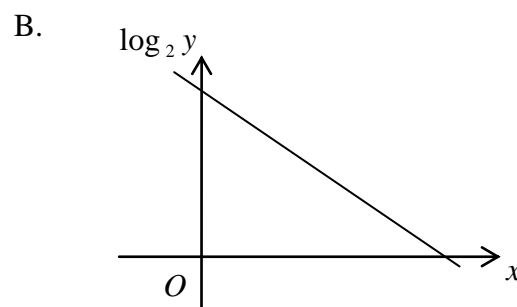
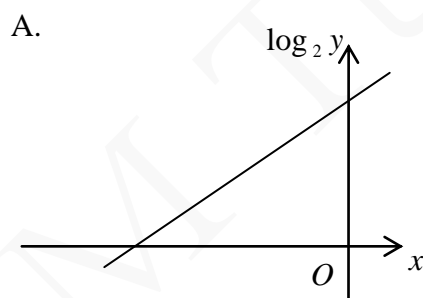
31. The H.C.F. and the L.C.M. of three expressions are $2xz$ and $8x^2y^2z^3$ respectively. If the first expression and the second expression are $2x^2yz$ and $4x^2z^2$ respectively, then the third expression is

- A. $2xyz$.
- B. $8xyz^3$.
- C. $2xy^2z$.
- D. $8xy^2z^3$.

32.



The figure above shows the graph of $y = ab^x$, where a and b are constants. Which of the following graphs may represent the relation between $\log_2 y$ and x ?



33. Which of the following is the greatest?

- A. 126^{261}
- B. 216^{216}
- C. 612^{162}
- D. 621^{126}

34. $A0000D02016_{16} =$

- A. $11 \times 16^{10} + 14 \times 16^5 + 8214.$
- B. $10 \times 16^{10} + 13 \times 16^5 + 8214.$
- C. $11 \times 16^{11} + 14 \times 16^6 + 131424.$
- D. $10 \times 16^{11} + 13 \times 16^6 + 131424.$

35. $i^5(5 - \beta i) =$

- A. $-\beta - 5i.$
- B. $-\beta + 5i.$
- C. $\beta + 5i.$
- D. $\beta - 5i.$

36. If $\alpha \neq \beta$ and $\begin{cases} 7\alpha = \alpha^2 + 6 \\ 7\beta = \beta^2 + 6 \end{cases}$, then $\frac{1}{\alpha} + \frac{1}{\beta} =$

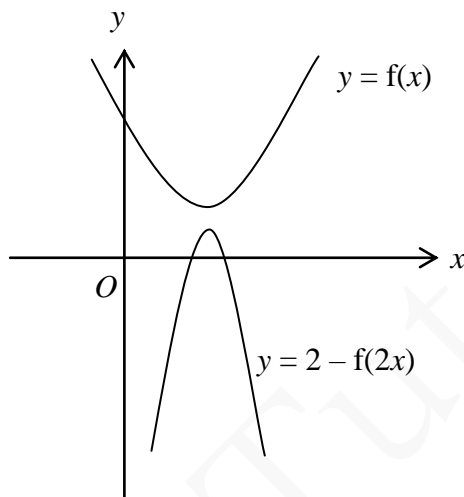
- A. $\frac{7}{6}.$
- B. $-\frac{7}{6}.$
- C. $\frac{6}{7}.$
- D. $-\frac{6}{7}.$

37. If $m > 1$, which of the following are geometric sequences?

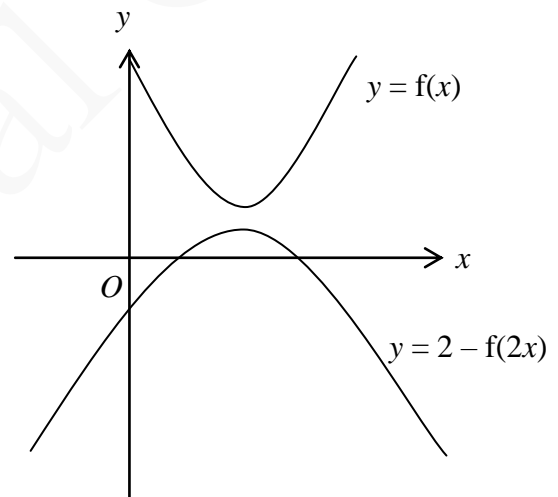
- I. $1.1m^2, 2.2m^4, 4.4m^6, 8.8m^8$
 - II. $3^m, 3^{4m}, 3^{7m}, 3^{10m}$
 - III. $\log 2m, \log 4m, \log 8m, \log 16m$
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

38. Which of the following may represent the graph of $y = f(x)$ and the graph of $y = 2 - f(2x)$ on the same rectangular coordinate system?

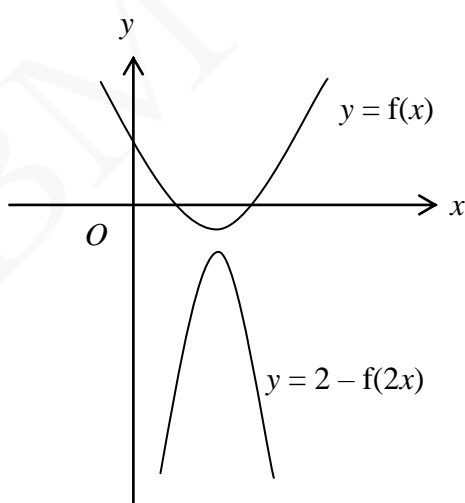
A.



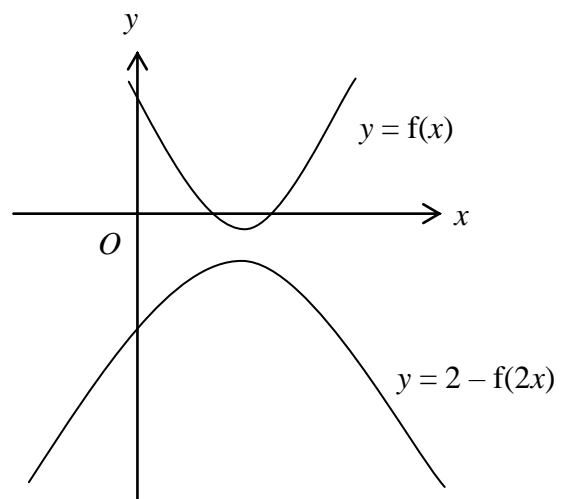
B.



C.



D.



39. For $0^\circ \leq x \leq 360^\circ$, how many roots does the equation $\cos^2 x = \cos x$ have?

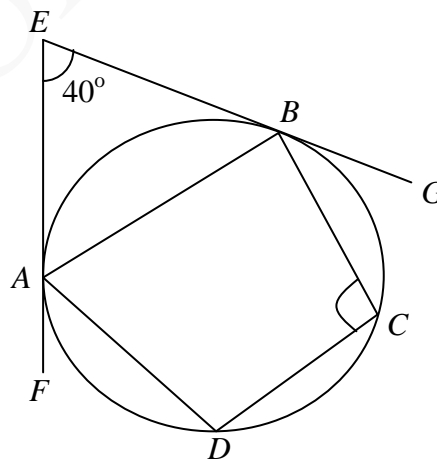
- A. 1
- B. 2
- C. 3
- D. 4

40. If a side of a regular tetrahedron is 6 cm, then the volume of the tetrahedron is

- A. 12 cm^3 .
- B. $12\sqrt{2} \text{ cm}^3$
- C. $18\sqrt{2} \text{ cm}^3$
- D. $18\sqrt{3} \text{ cm}^3$

41. In the figure, EF and EG are the tangents to the circle ABCD at A and B respectively. If $\angle AEB = 40^\circ$ and $AB = AD$, then $\angle BCD =$

- A. 70° .
- B. 90° .
- C. 110° .
- D. 140° .



42. If the straight line $x + y = k$ intersects with the circle $x^2 + y^2 - 4ky + 2 = 0$ at A and B, then the y-coordinate of the mid-point of AB is

- A. $-3k$.
- B. $3k$.
- C. $-\frac{3k}{2}$.
- D. $\frac{3k}{2}$.

43. A ten-character code is formed by a permutation of A, B, C, D and a permutation of 1, 3, 4, 6, 8, 9 respectively. How many different ten-character codes can be formed?
- A. 24
 - B. 744
 - C. 17 280
 - D. 3 628 800
44. A bag contains 1 red ball, 2 yellow balls and 3 blue balls. Peter repeats drawing one ball at a time randomly from the bag without replacement until a blue ball is drawn. Find the probability that he needs no more than three draws.
- A. $\frac{3}{20}$
 - B. $\frac{1}{2}$
 - C. $\frac{4}{5}$
 - D. $\frac{19}{20}$
45. If the variance of the six numbers x_1, x_2, x_3, x_4, x_5 and x_6 is 6, then the variance of the six numbers $10 - 2x_1, 10 - 2x_2, 10 - 2x_3, 10 - 2x_4, 10 - 2x_5$ and $10 - 2x_6$ is
- A. 12.
 - B. 22.
 - C. 24.
 - D. 34.

END OF PAPER