

**MOCK EXAM 4**  
**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

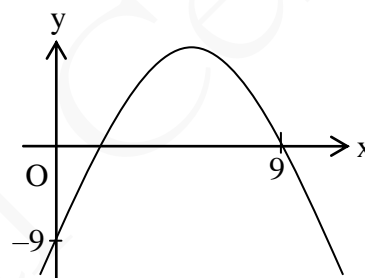
- $(4x)^2 \cdot x^4 =$ 
  - $4x^6$ .
  - $8x^8$ .
  - $16x^6$ .
  - $16x^8$ .
  
- $x^2 - 4y^2 - 4y - 1 =$ 
  - $(x + 2y + 1)(x - 2y - 1)$ .
  - $(x + 2y + 1)(x - 2y + 1)$ .
  - $(x - 2y + 1)(x - 2y - 1)$ .
  - $(x - 2y + 1)(x - 2y + 1)$ .
  
- If  $p$  and  $q$  are constants such that  $p(x + 2)^2 + q(x - 1)^2 = x^2 + 28x + 16$ , then  $q =$ 
  - $-5$ .
  - $-4$ .
  - $4$ .
  - $5$ .
  
- Let  $f(x) = x^3 + 2x^2 - 3x + 4$ . When  $f(x)$  is divided by  $x + 2$ , the remainder is
  - $-18$ .
  - $-6$ .
  - $10$ .
  - $14$ .

5. Which of the following equations has roots  $-2$  and  $\frac{1}{3}$ ?

- A.  $x^2 + 5x - 2 = 0$
- B.  $3x^2 - 5x - 2 = 0$
- C.  $3x^2 + 5x - 2 = 0$
- D.  $3x^2 - 5x + 2 = 0$

6. The figure shows the graph of  $y = -x^2 + mx + n$ , where  $m$  and  $n$  are constants. The equation of the axis of symmetry of the graph is

- A.  $x = 3$ .
- B.  $x = 4$ .
- C.  $x = 5$ .
- D.  $x = 6$ .



7. The solution of  $8 - 5x < 3$  and  $3x + 6 > 0$  is

- A.  $x > -2$ .
- B.  $x > -1$ .
- C.  $x > 1$ .
- D.  $-2 < x < 1$ .

8. If  $2m + 3n + 18 = 3m - 2n = 2$ , then  $n =$

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

9. There are 798 students in a school. If the number of boys is 10% less than that of girls, then the number of girls is
- A. 378.
  - B. 380.
  - C. 418.
  - D. 420.
10. Mary buys a camera for \$3 600. She sells the camera to Peter at a profit of 10%. At what price should Peter sell the camera in order to have a profit of 10%?
- A. \$4 320
  - B. \$4 356
  - C. \$4 400
  - D. \$4 500
11. It is given that  $z$  varies directly as  $x$  and inversely as  $y^2$ . If  $x$  is decreased by 20% and  $z$  is increased by 25%, then  $y$
- A. is increased by 25%.
  - B. is increased by 75%.
  - C. is decreased by 20%.
  - D. is decreased by 80%.
12. Let  $m$  and  $n$  be non-zero constants. If  $(2m + n) : (3m - 2n) = 8 : 5$ , then  $m : n =$
- A. 2 : 3.
  - B. 3 : 2.
  - C. 21 : 34.
  - D. 34 : 21.

13. The length and width of a rectangle are measured as 25 cm and 16 cm correct to the nearest cm respectively. Find the relative error in calculating the perimeter of the rectangle.

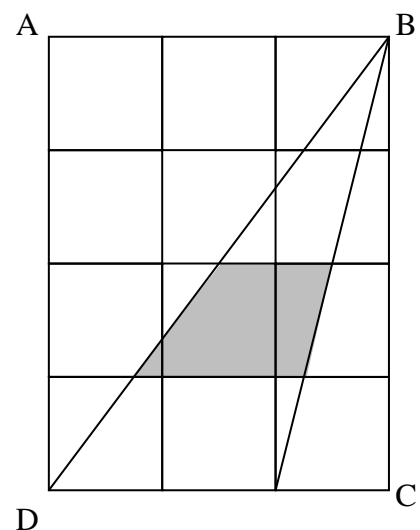
- A.  $\frac{1}{164}$
- B.  $\frac{1}{82}$
- C.  $\frac{1}{41}$
- D.  $\frac{2}{41}$

14. Let  $a_n$  be  $n$ th term of a sequence. If  $a_1 = 3$ ,  $a_2 = 5$ ,  $a_3 = 8$  and  $a_{n+3} = a_{n+2} + a_n$  for any positive integer  $n$ , then  $a_7 =$

- A. 35.
- B. 51.
- C. 55.
- D. 89.

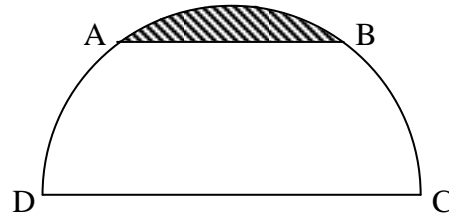
15. In the figure, ABCD is a rectangle formed by 12 squares. If the area of each square is  $1 \text{ cm}^2$ , find the area of shaded region.

- A.  $\frac{7}{4} \text{ cm}^2$
- B.  $\frac{9}{4} \text{ cm}^2$
- C.  $\frac{7}{3} \text{ cm}^2$
- D.  $\frac{5}{4} \text{ cm}^2$



16. In the figure, the diameter of the semicircle is 8 cm. If  $AB = 5$  cm, find the area of the shaded region correct to the nearest  $0.01 \text{ cm}^2$ .

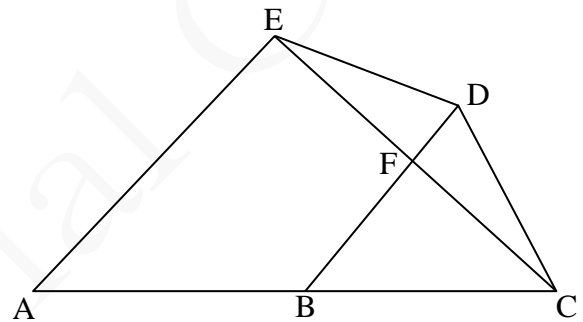
- A.  $1.34 \text{ cm}^2$
- B.  $1.45 \text{ cm}^2$
- C.  $3.00 \text{ cm}^2$
- D.  $4.57 \text{ cm}^2$



17. In the figure, B is a point lying on AC such that  $AB : BC = 3 : 2$ . It is given that  $AE \parallel BD$ . If the area of  $\triangle BCD$  and the area of  $\triangle DEF$  are  $12 \text{ cm}^2$  and  $6 \text{ cm}^2$  respectively, then the area of quadrilateral ABDE is

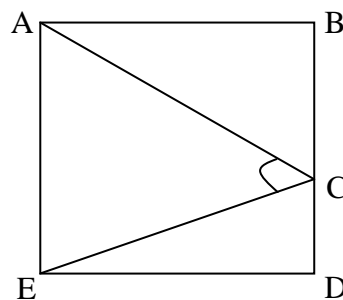
is

- A.  $42 \text{ cm}^2$ .
- B.  $48 \text{ cm}^2$ .
- C.  $50 \text{ cm}^2$ .
- D.  $60 \text{ cm}^2$ .



18. In the figure, ABCD is a square. If  $BC : CD = 2 : 1$ , find  $\angle ACE$  correct to the nearest  $0.1^\circ$ .

- A.  $71.6^\circ$
- B.  $56.3^\circ$
- C.  $51.7^\circ$
- D.  $52.1^\circ$

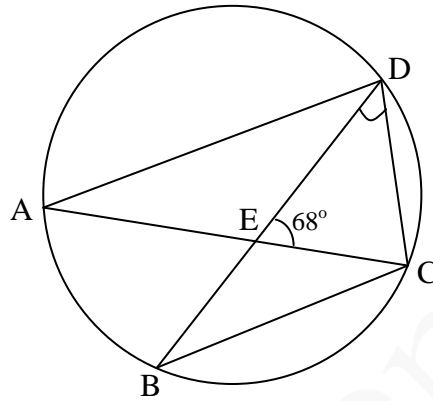


19. In  $\triangle ABC$ ,  $AB : BC : AC = 7 : 24 : 25$ . Find  $\sin A : \sin C$ .

- A.  $7 : 24$
- B.  $7 : 25$
- C.  $24 : 7$
- D.  $24 : 25$

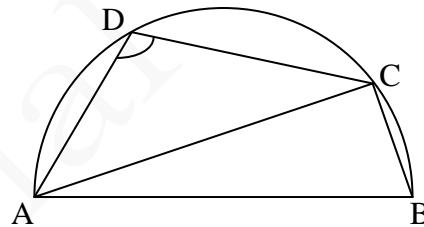
20. In the figure, ABCD is a circle. AC and BD intersect at E. If  $AD \parallel BC$ ,  $\angle DEC = 68^\circ$  and  $AD = BD$ , then  $\angle CDE =$

- A.  $34^\circ$ .
- B.  $39^\circ$ .
- C.  $56^\circ$ .
- D.  $73^\circ$ .



21. In the figure, ABCD is a semicircle. If  $\angle DAC = 34^\circ$  and  $\widehat{DC} : \widehat{CB} = 2 : 1$ , then  $\angle ADC =$

- A.  $107^\circ$ .
- B.  $112^\circ$ .
- C.  $124^\circ$ .
- D.  $129^\circ$ .



22. Which of the following statements about a regular 10-sided polygon are true?

- I. Each interior angle is  $144^\circ$ .
- II. Each interior angle is 4 times an exterior angle.
- III. The number of axes of reflectional symmetry is 10.

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

23. A(-5, 2) and B(-7, 8) are two points. If C lies on y-axis such that  $AC = BC$ , find the coordinates of C.

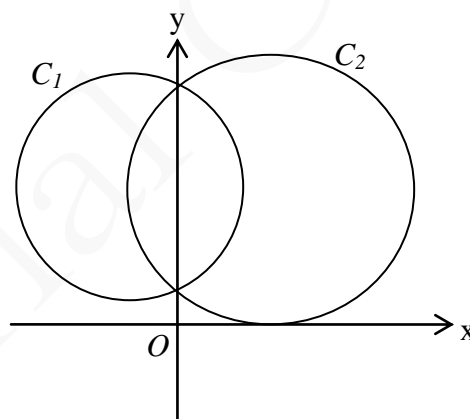
- A. (0, 7)
- B. (0, 6)
- C. (0, 5)
- D. (-6, -5)

24. The rectangular coordinates of the point P are  $(-\sqrt{3}, 5)$ . If P is reflected with respect to the straight line  $y = 2$ , then the polar coordinates of its image are

- A.  $(2, 210^\circ)$ .
- B.  $(2, 240^\circ)$ .
- C.  $(4, 210^\circ)$ .
- D.  $(4, 240^\circ)$ .

25. In the figure, the radius of the circle  $C_1$  and the coordinates of its centre are  $r_1$  and  $(h_1, k_1)$  respectively. The radius of the circle  $C_2$  and the coordinates of its centre are  $r_2$  and  $(h_2, k_2)$  respectively. Which of the following are true?

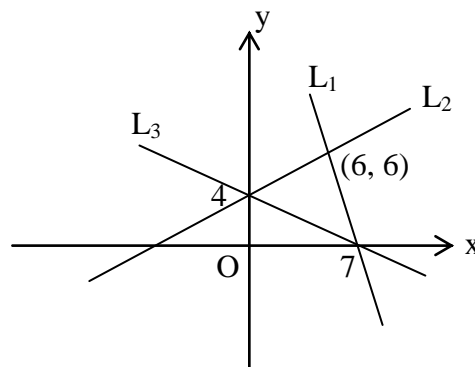
- I.  $h_2 - h_1 < r_1 + r_2$
  - II.  $h_2 - k_2 > 0$
  - III.  $k_1 + k_2 > r_1 + r_2$
- A. I and II only
  - B. I and III only
  - C. II and III only
  - D. I, II and III



26. In the figure, the x-intercepts of the straight lines  $L_1$  and  $L_3$  are 7 while the y-intercepts of the straight lines  $L_2$  and  $L_3$  are 4. Which of the following are true?

- I. The equation of  $L_1$  is  $6x + y - 42 = 0$ .
- II. The point  $(12, 8)$  lies on  $L_2$ .
- III. The slope of  $L_3$  is  $\frac{4}{7}$ .

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

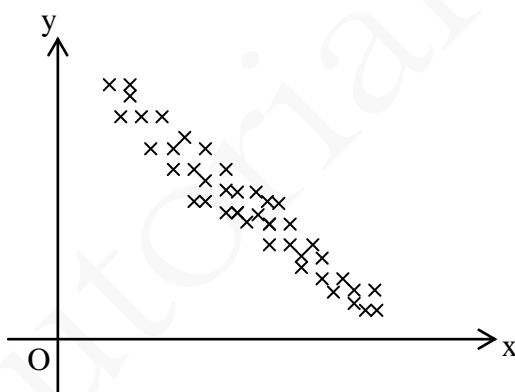




27. Two numbers are randomly drawn at the same time from 6 cards numbered 1, 2, 4, 5, 7 and 8 respectively. Find the probability that the sum of the numbers drawn is a multiple of 3.

- A.  $\frac{1}{3}$
- B.  $\frac{1}{5}$
- C.  $\frac{3}{5}$
- D.  $\frac{8}{15}$

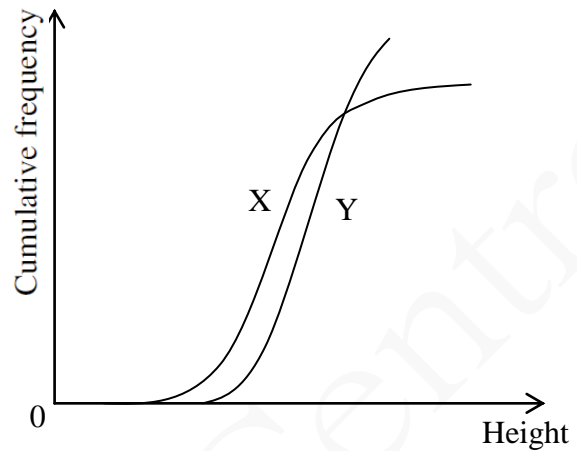
28. The scatter diagram below shows the relation between  $x$  and  $y$ . Which of the following may represent the relation between  $x$  and  $y$ ?



- A.  $y$  increases when  $x$  increases.
- B.  $y$  decreases when  $x$  increases.
- C.  $y$  varies directly as  $x^2$ .
- D.  $y$  varies inversely as  $x$ .

29. The figure below shows the cumulative frequency curves of the height distributions X and Y. Let  $m_X$ ,  $r_X$  and  $s_X$  be the median, the range and the standard deviation of X respectively while  $m_Y$ ,  $r_Y$  and  $s_Y$  be the median, the range and the standard deviation of Y respectively. Which of the following are true?

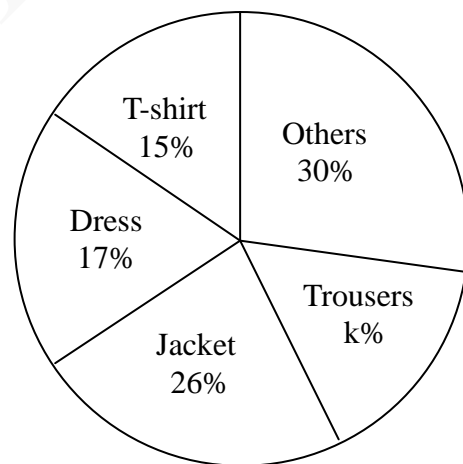
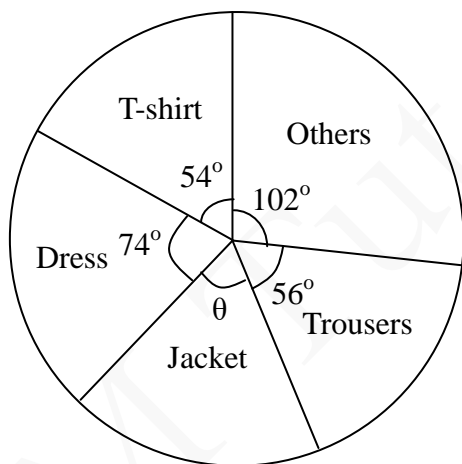
- I.  $m_X < m_Y$
  - II.  $r_X > r_Y$
  - III.  $s_X < s_Y$
- A. I and II only
  - B. I and III only
  - C. II and III only
  - D. I, II and III



30. The pie charts below show the distributions of the profits of clothes shop X and Y from the sales of clothes in a certain month. Which of the following must be true?

Distribution of the profits of clothes shop X

Distribution of the profits of clothes shop Y



- A. In that month, the profit from the sales of T-shirts of clothes shop X is the same as that of clothes shop Y.
- B.  $k = 14$
- C.  $\theta = 72$
- D. In that month, the total profit from the sales of T-shirts and dresses of clothes shop X is less than the total profit from the sales of jackets and trousers of the shop.

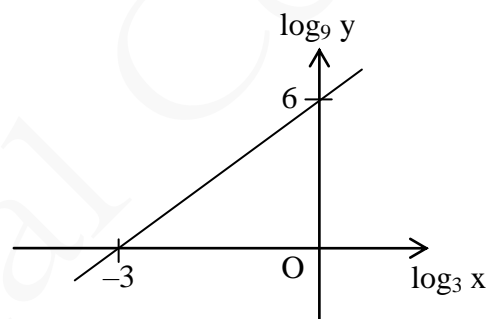
## Section B

31. The H.C.F. of  $4a^2b^6c^3$ ,  $6a^3b^3$  and  $8a^4b^2c^7$  is

- A.  $2a^2b^2$ .
- B.  $2a^2b^2c^3$ .
- C.  $24a^4b^6c^7$ .
- D.  $24a^9b^{11}c^{10}$ .

32. The graph in the figure shows the linear relation between  $\log_9 y$  and  $\log_3 x$ . If  $y = Ax^b$ , then  $b =$

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



33.  $10010001010001_2 =$

- A.  $2^{13} + 2^{10} + 81$ .
- B.  $2^{13} + 2^{10} + 161$ .
- C.  $2^{14} + 2^{11} + 81$ .
- D.  $2^{14} + 2^{11} + 161$ .

34. If  $x + \log y = x^2 + \log y^2 - 11 = 3$ , then  $y =$

- A. 100 000.
- B. 5 or -1.
- C.  $\frac{1}{100000}$  or 10.
- D.  $\frac{1}{10}$  or 100 000.

35. If  $k$  is a real number, then the real part of  $(4 - ki)(5 + i)$  is

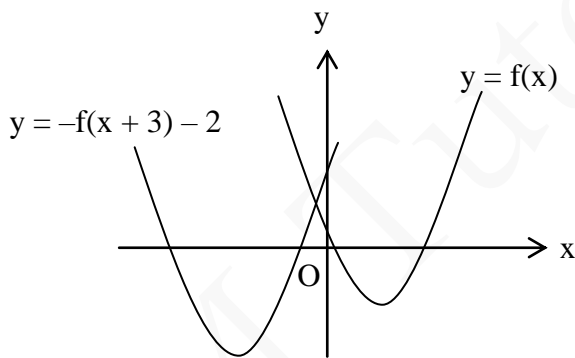
- A.  $4 + 5k$ .
- B.  $4 - 5k$ .
- C.  $20 - k$ .
- D.  $20 + k$ .

36. Let  $a_n$  be the  $n$ th term of an arithmetic sequence. If  $a_1 + 4 = a_2$  and  $a_1 + a_2 + \dots + a_{36} = 1\,080$ , then  $a_1 =$

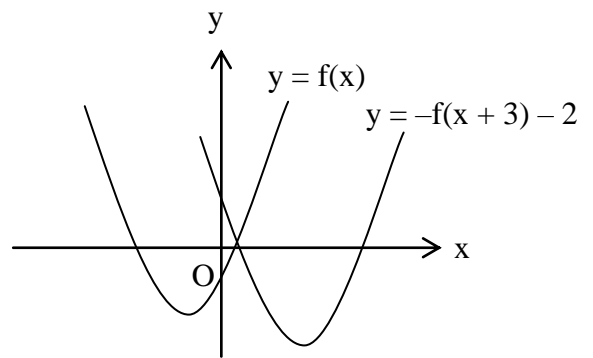
- A. 48.
- B. 40.
- C. -20.
- D. -40.

37. Which of the following may represent the graph of  $y = f(x)$  and the graph of  $y = -f(x + 3) - 2$  on the same rectangular coordinate system?

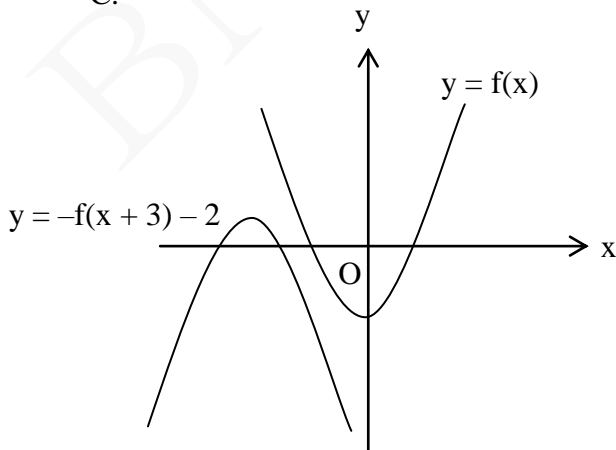
A.



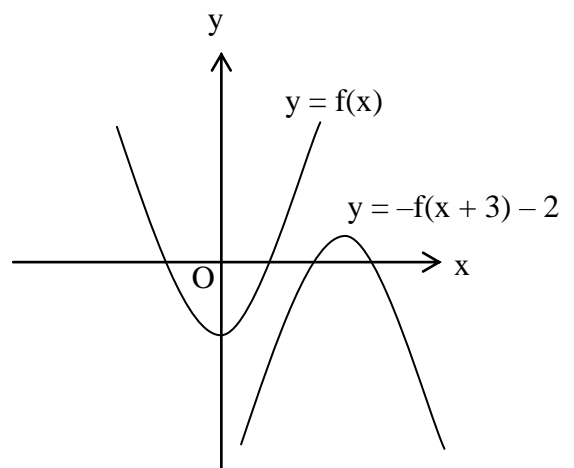
B.



C.



D.

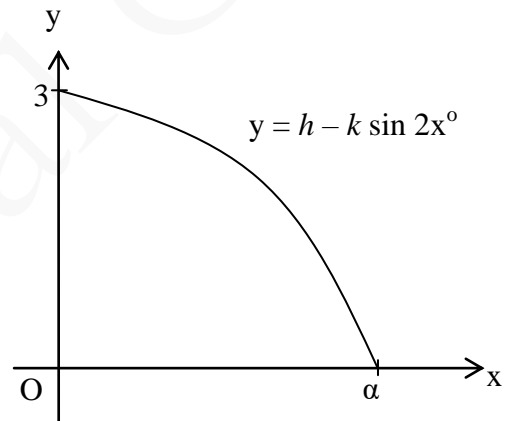


38. Let  $b > 0$ . If  $a = \log_4 \frac{1}{b}$ , then  $\frac{1}{a} =$

- A.  $\log_4 b$ .
- B.  $\log_b 4$ .
- C.  $\log_b \frac{1}{4}$ .
- D.  $\frac{1}{\log_b 4}$ .

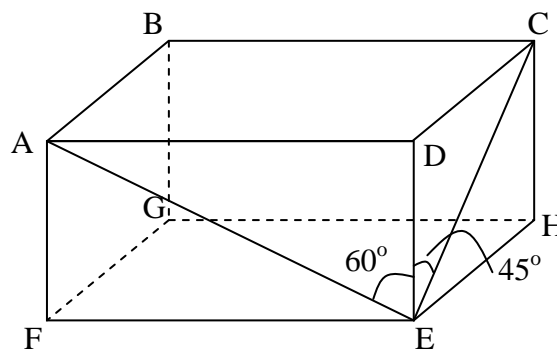
39. Let  $h$  and  $k$  be constants. The figure shows the graph of  $y = h - k \sin 2x^\circ$ , where  $0 \leq x \leq \alpha$ . Which of the following are true?

- I.  $h > 0$
  - II.  $k > 0$
  - III.  $\sin 2\alpha^\circ = \frac{3}{k}$
- A. I and II only
  - B. I and III only
  - C. II and III only
  - D. I, II and III



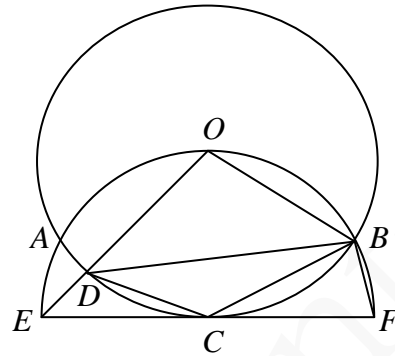
40. In the figure, ABCDEFGH is a cuboid. Find  $\cos \angle CAE$ .

- A.  $\frac{1}{2\sqrt{2}}$
- B.  $\frac{1}{\sqrt{2}}$
- C.  $\frac{1}{4}$
- D.  $\frac{3}{4}$



41. In the figure,  $O$  is the centre of the circle  $ABCD$ .  $C$  is the centre of the semicircle  $EOF$ .  $EF$  is the tangent to the circle  $ABCD$  at  $C$ .  $OE$  intersects the circle  $ABCD$  at  $D$ . The circle  $ABCD$  intersects the semicircle  $EOF$  at  $A$  and  $B$ .  $\angle BDC =$

- A.  $22.5^\circ$ .  
 B.  $30^\circ$ .  
 C.  $45^\circ$ .  
 D.  $60^\circ$ .



42. Find the range of values of  $k$  such that the circle  $x^2 + y^2 - 6x + ky + 4 = 0$  and the straight line  $2x - y + 4 = 0$  intersect at two distinct points.
- A.  $-15 < k < 5$   
 B.  $-5 < k < 15$   
 C.  $k < -5$  or  $k > 15$   
 D.  $k < -15$  or  $k > 5$

43. Let  $O$  be the origin. If the coordinates of points  $A$  and  $B$  are  $(0, 36)$  and  $(-16, -12)$  respectively, then the  $x$ -coordinate of the orthocentre of  $\triangle OAB$  is
- A.  $-12$ .  
 B.  $4$ .  
 C.  $12$ .  
 D.  $36$ .

44. 0, 2, 4, 6 and 8 are known as even digits while 1, 3, 5, 7 and 9 are known as odd digits. The first digit of an eight-digit phone number is either 6 or 9. If the remaining digits are formed by a permutation of all digits (including 6 and 9), how many different eight-digit phone numbers with at least 3 even digits can be formed?
- A. 1 108 800
  - B. 1 159 200
  - C. 1 209 600
  - D. 20 000 000

45. The mode, the variance and the inter-quartile range of a set of numbers are 30, 15 and 18 respectively. If 4 is added to each number of the set and each resulting number is then doubled to form a new set of numbers, find the mode, the variance and the inter-quartile range of the new set of numbers.

	<u>Mode</u>	<u>Variance</u>	<u>Inter-quartile range</u>
A.	64	30	44
B.	68	60	44
C.	68	30	36
D.	68	60	36

**END OF PAPER**