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HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION

PRACTICE PAPER
MATHEMATICS Compulsory Part
PAPER 2

(1¼ hours)

INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should first stick a barcode label and insert the information required in the spaces provided. No extra time will be given for sticking on the barcode label after the 'Time is up' announcement.

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.

Not to be taken away before the end of the examination session

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. $x^3(2x+x) =$

   A. $3x^4$.

   B. $2x^5$.

   C. $3x^5$.

   D. $2x^6$.

2. If $3a+1=3(b-2)$, then $b =$

   A. $a+1$.

   B. $a+3$.

   C. $a+\frac{7}{3}$.

   D. $a-\frac{5}{3}$.

3. $p^2-q^2-p-q =$

   A. $(p+q)(p-q-1)$.

   B. $(p+q)(p+q-1)$.

   C. $(p-q)(p-q+1)$.

   D. $(p-q)(p+q-1)$.

4. Let m and n be constants. If $m(x-3)^2+n(x+1)^2 \equiv x^2-38x+41$, then $m=$

A. -4.

B. -1.

C. 3.

D. 5.

5. Let $f(x)=x^4-x^3+x^2-x+1$. When $f(x)$ is divided by $x+2$, the remainder is

A. -2.

B. 0.

C. 11.

D. 31.

6. Let k be a constant. If the quadratic equation $3x^2+2kx-k=0$ has equal roots, then $k=$

A. -3.

B. 3.

C. -3 or 0.

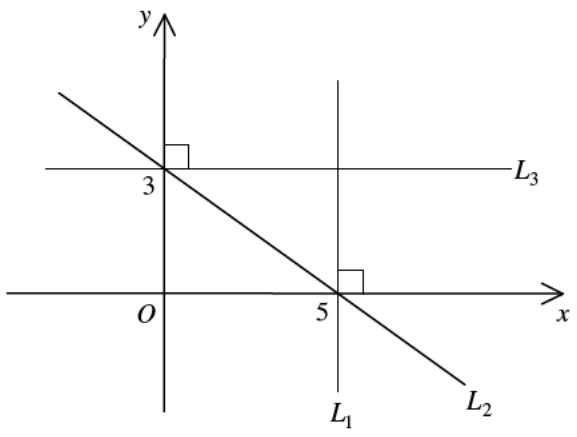
D. 0 or 3.

7. In the figure, the x-intercepts of the straight lines L_1 and L_2 are 5 while the y-intercepts of the straight lines L_2 and L_3 are 3. Which of the following are true?

I. The equation of L_1 is $x=5$.

II. The slope of L_2 is $\frac{3}{5}$.

III. The point $(2, 3)$ lies on L_3.



A. I and II only

B. I and III only

C. II and III only

D. I, II and III

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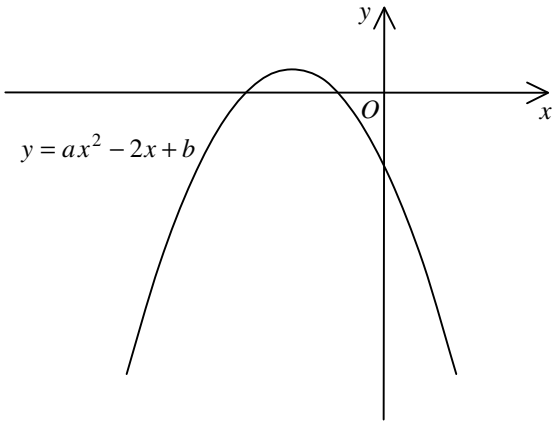
8. The figure shows the graph of $y = ax^2 - 2x + b$, where a and b are constants. Which of the following is/are true?

I. $a > 0$
II. $b < 0$
III. $ab < 1$



A. I only

B. II only

C. I and III only

D. II and III only

9. The solution of $4x > x - 3$ or $3 - x < x + 7$ is

A. $x > -2$.

B. $x < -2$.

C. $x > -1$.

D. $x < -2$ or $x > -1$.

10. John buys a vase for $\$1600$. He then sells the vase to Susan at a profit of 20%. At what price should Susan sell the vase in order to have a profit of 20%?

A. $\$2240$

B. $\$2304$

C. $\$2400$

D. $\$2500$

11. If the circumference of a circle is increased by 40%, then the area of the circle is increased by

A. 18%.

B. 20%.

C. 40%.

D. 96%.

12. Let α and β be non-zero constants. If $(\alpha+\beta):(3\alpha-\beta)=7:3$, then $\alpha:\beta=$

A. $5:9$.

B. $9:5$.

C. $19:29$.

D. $29:19$.

13. If z varies directly as x and inversely as y^2, which of the following must be constant?

A. $\dfrac{x}{y^2z}$

B. $\dfrac{z}{xy^2}$

C. $\dfrac{yz}{x^2}$

D. $\dfrac{xz}{y^2}$

14. $0.009049999=$

A. 0.00905 (correct to 3 decimal places).

B. 0.00905 (correct to 3 significant figures).

C. 0.00905 (correct to 6 decimal places).

D. 0.00905 (correct to 6 significant figures).

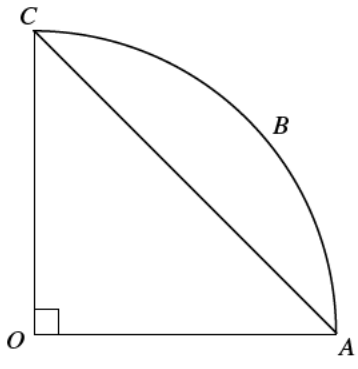
15. In the figure, O is the centre of the sector $OABC$. If the area of ΔOAC is 12 cm^2, find the area of the segment ABC.

A. $3(\pi-2)\text{ cm}^2$

B. $3(\pi-1)\text{ cm}^2$

C. $6(\pi-2)\text{ cm}^2$

D. $6(\pi-1)\text{ cm}^2$



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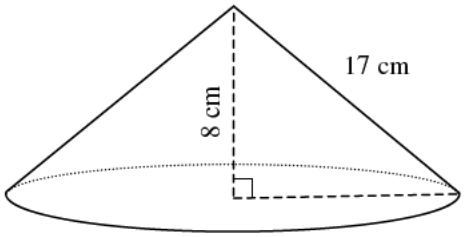
16. The figure shows a right circular cone of height 8 cm and slant height 17 cm. Find the volume of the circular cone.

A. $255\pi\text{ cm}^3$

B. $345\pi\text{ cm}^3$

C. $480\pi\text{ cm}^3$

D. $600\pi\text{ cm}^3$



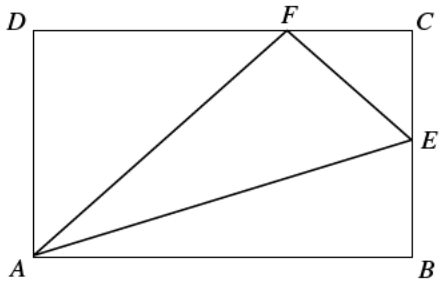
17. In the figure, $ABCD$ is a rectangle. E is the mid-point of BC. F is a point lying on CD such that $DF = 2CF$. If the area of ΔCEF is 1 cm^2, then the area of ΔAEF is

A. 2 cm^2.

B. 3 cm^2.

C. 4 cm^2.

D. 6 cm^2.



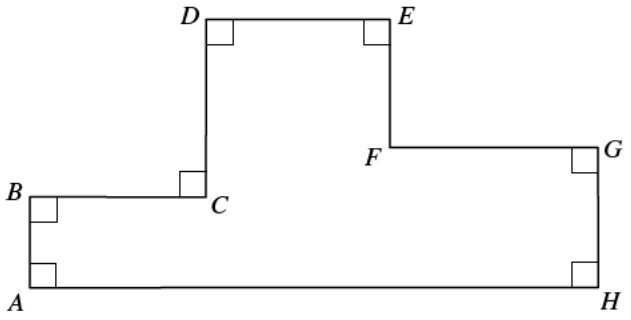
18. In the figure, $AB = 4\text{ cm}$, $BC = CD = DE = 8\text{ cm}$ and $FG = 9\text{ cm}$. Find the perimeter of ΔAEH.

A. 60 cm

B. 74 cm

C. 150 cm

D. 164 cm



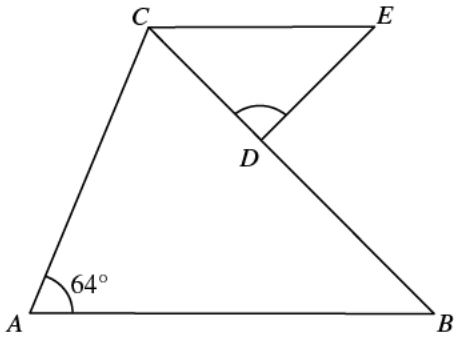
19. In the figure, $AB = BC$ and D is a point lying on BC such that $CD = DE$. If $AB // CE$, find $\angle CDE$.

A. 52°

B. 58°

C. 64°

D. 76°



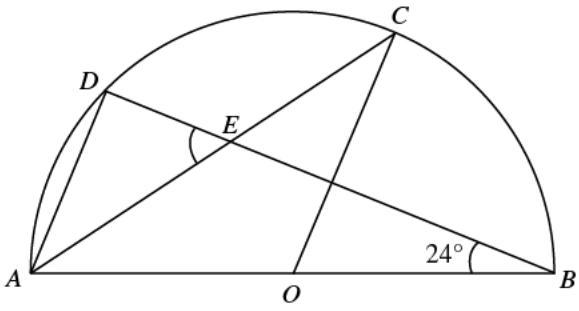
20. In the figure, O is the centre of the semi-circle $ABCD$. AC and BD intersect at E. If $AD // OC$, then $\angle AED =$

A. 48°.

B. 55°.

C. 57°.

D. 66°.



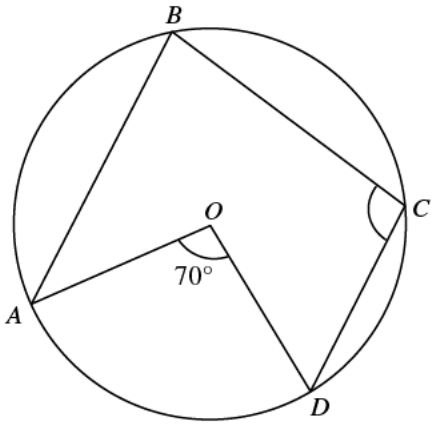
21. In the figure, O is the centre of the circle $ABCD$. If $\overset{\frown}{AB} = \overset{\frown}{BC} = 2\overset{\frown}{CD}$, then $\angle BCD =$

A. 64°.

B. 87°.

C. 93°.

D. 116°.



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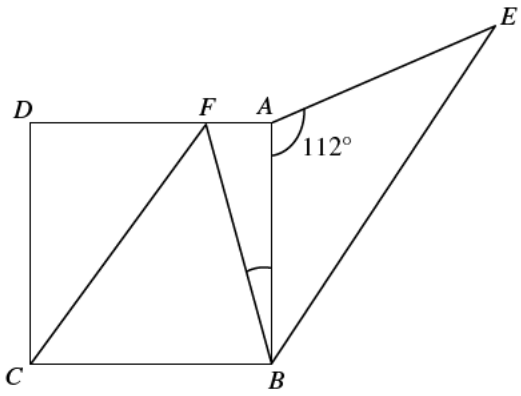
22. In the figure, $ABCD$ is a square. F is a point lying on AD such that $CF // BE$. If $AB = AE$, find $\angle ABF$ correct to the nearest degree.



A. 17°

B. 18°

C. 22°

D. 26°

23. For $0° \le \theta \le 90°$, the least value of $\dfrac{30}{3\sin^2\theta + 2\sin^2(90° - \theta)}$ is

A. 5.

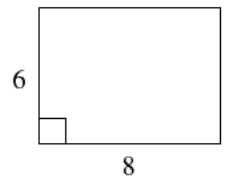
B. 6.

C. 10.

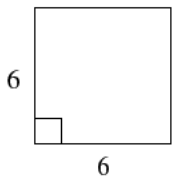
D. 15.

24. Which of the following parallelograms have rotational symmetry and reflectional symmetry?

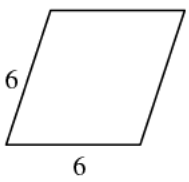
I.



II.



III.



A. I and II only

B. I and III only

C. II and III only

D. I, II and III

25. If the point $(-2,-1)$ is reflected with respect to the straight line $y=-5$, then the coordinates of its image are

A. $(-8,-1)$.

B. $(-2,-9)$.

C. $(-2,11)$.

D. $(12,-1)$.

26. The coordinates of the points A and B are $(1,-3)$ and $(-5,7)$ respectively. If P is a point lying on the straight line $y=x+2$ such that $AP=PB$, then the coordinates of P are

A. $(-2,0)$.

B. $(-2,2)$.

C. $(0,2)$.

D. $(3,5)$.

27. The equation of a circle is $2x^2+2y^2+8x-12y+3=0$. Which of the following are true?

I. The coordinates of the centre of the circle are $(-2,3)$.
II. The radius of the circle is 7.
III. The point $(2,3)$ lies outside the circle.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

Go on to the next page

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

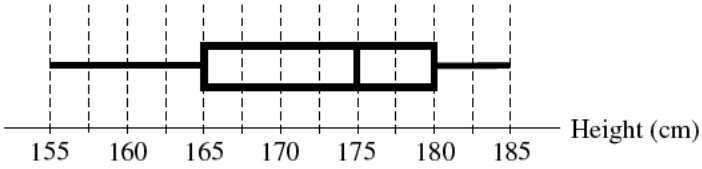
A. $\frac{1}{3}$

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

C. $\frac{1}{6}$

D. $\frac{5}{16}$

29. The box-and-whisker diagram below shows the distribution of the heights (in cm) of some students. Which of the following is/are true?



I. The height of the tallest student is 180 cm.
II. The inter-quartile range of the distribution is 15 cm.
III. Less than half of the students are taller than 170 cm.

A. I only

B. II only

C. I and III only

D. II and III only

30. The figure below shows the cumulative frequency polygons of the test score distributions X and Y. Let m_1, r_1 and s_1 be the median, the range and the standard deviation of X respectively while m_2, r_2 and s_2 be the median, the range and the standard deviation of Y respectively. Which of the following are true?

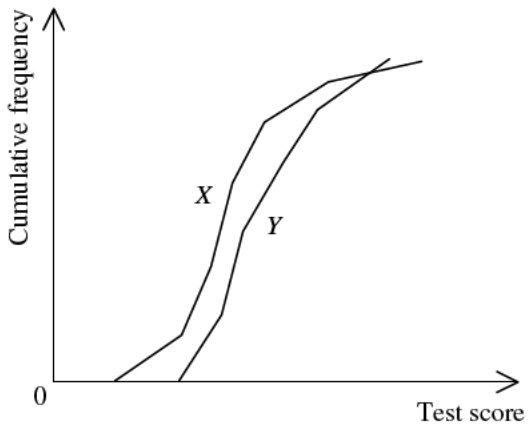
I. $m_1 > m_2$
II. $r_1 > r_2$
III. $s_1 > s_2$

A. I and II only

B. I and III only

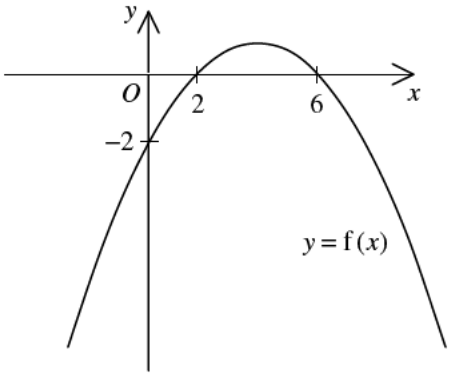
C. II and III only

D. I, II and III



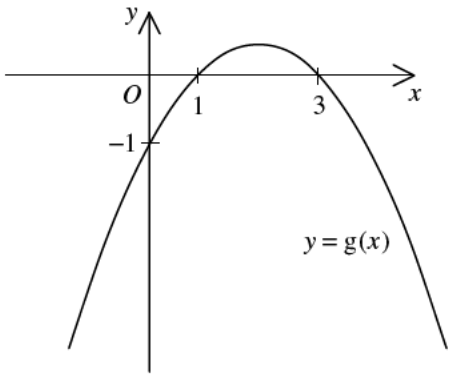
Section B

31.

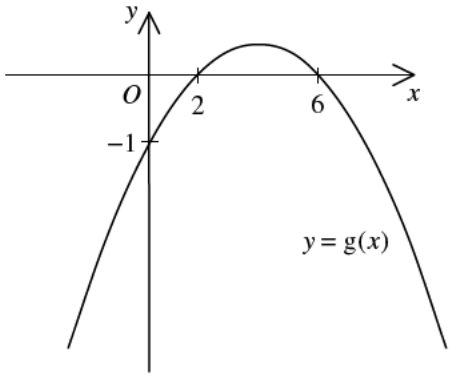


The figure above shows the graph of $y = f(x)$. If $2f(x) = g(x)$, which of the following may represent the graph of $y = g(x)$?

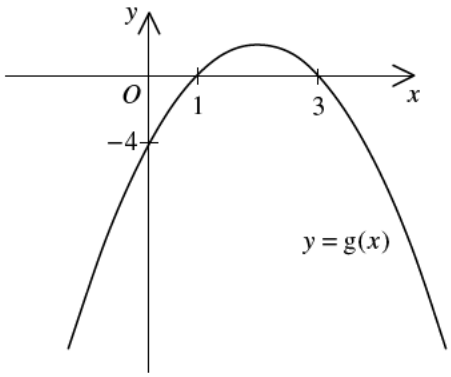
A.



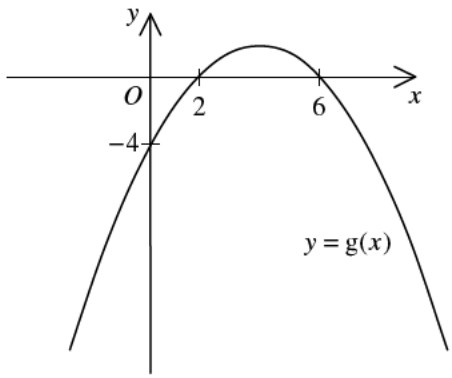
B.



C.



D.



32. $B0000000023_{16} =$

A. $11\times16^{10}+23$.

B. $11\times16^{10}+35$.

C. $12\times16^{11}+23$.

D. $12\times16^{11}+35$.

Go on to the next page

33. If the roots of the quadratic equation $x^2 - kx + 3 = 0$ are α and β, then $\alpha^3 + \beta^3 =$

A. k^3 .

B. $k^3 - 3k$.

C. $k^3 - 9k$.

D. $k^3 - 12k$.

34. If x is a real number, then the real part of $(x + 3i)(3 + i)$ is

A. $3x$.

B. $x + 3$.

C. $3x + 3$.

D. $3x - 3$.

35. The nth term of a sequence is $2n + 3$. If the sum of the first m terms of the sequence is less than 3000 , then the greatest value of m is

A. 52 .

B. 53 .

C. 56 .

D. 57 .

36. Let $b > 1$. If $a = \log_{12} b$, then $\frac{1}{a} =$

A. $\log_b \frac{1}{12}$.

B. $\log_b 12$.

C. $\log_{12} \frac{1}{b}$.

D. $\frac{1}{\log_b 12}$.

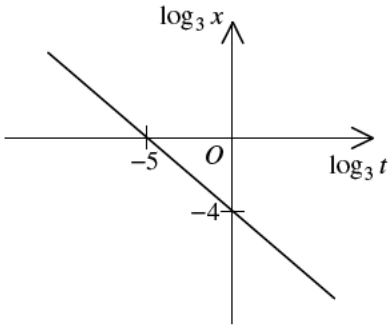
37. The graph in the figure shows the linear relation between $\log_3 t$ and $\log_3 x$. If $x = kt^a$, then $k =$

A. $\frac{1}{81}$.

B. 81.

C. $\frac{-4}{5}$.

D. $\frac{-5}{4}$.



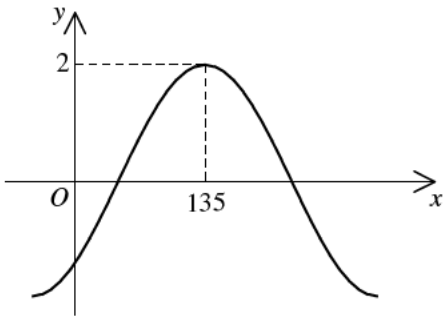
38. Let a be a constant and $-90° < \theta < 90°$. If the figure shows the graph of $y = a\sin(x° + \theta)$, then

A. $a = -2$ and $\theta = -45°$.

B. $a = -2$ and $\theta = 45°$.

C. $a = 2$ and $\theta = -45°$.

D. $a = 2$ and $\theta = 45°$.



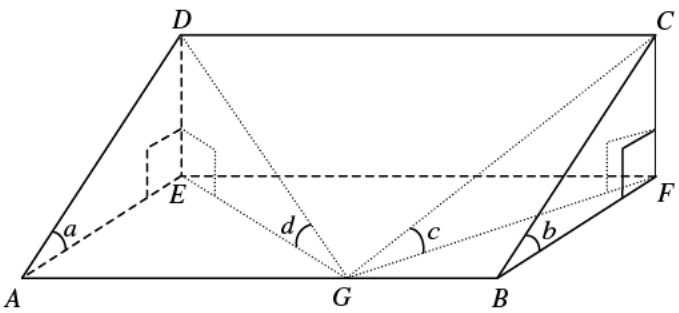
39. The figure shows a right prism $ABCDEF$ with a right-angled triangle as the cross-section. A, B, E and F lie on the horizontal ground. G is a point lying on AB such that $AG:GB = 5:3$. If $\angle DAE = a$, $\angle CBF = b$, $\angle CGF = c$ and $\angle DGE = d$, which of the following is true?

A. $a > c > d$

B. $a > d > c$

C. $c > b > d$

D. $c > d > b$



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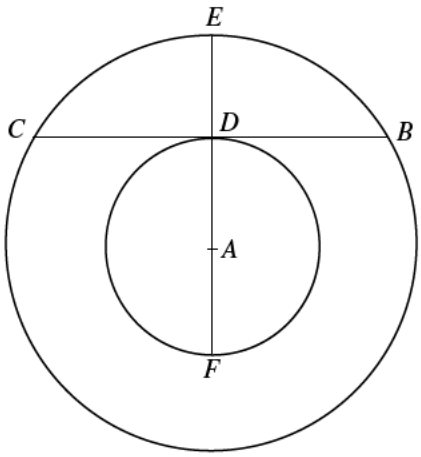
40. In the figure, A is the common centre of the two circles. BC is a chord of the larger circle and touches the smaller circle at D. AD produced meets the larger circle at E. F is a point lying on the smaller circle such that E, D, A and F are collinear. If $BC = 24\text{ cm}$ and $DE = 8\text{ cm}$, then $EF =$



A. 13 cm.

B. 16 cm.

C. 18 cm.

D. 20 cm.

41. If the straight line $x - y = 0$ and the circle $x^2 + y^2 + 6x + ky - k = 0$ do not intersect with each other, find the range of values of k.

A. $2 < k < 18$

B. $-18 < k < -2$

C. $k < 2$ or $k > 18$

D. $k < -18$ or $k > -2$

42. Let O be the origin. If the coordinates of the points A and B are $(18, -24)$ and $(18, 24)$ respectively, then the x-coordinate of the orthocentre of ΔOAB is

A. -14.

B. 10.

C. 12.

D. 25.

43. Mary, Tom and 8 other students participate in a solo singing contest. If each participant performs once only and the order of performance is randomly arranged, find the probability that Mary performs just after Tom.

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

B. $\frac{1}{10}$

C. $\frac{1}{45}$

D. $\frac{1}{90}$

44. The mean, the variance and the inter-quartile range of a set of numbers are 40, 9 and 18 respectively. If 5 is added to each number of the set and each resulting number is then tripled to form a new set of numbers, find the mean, the variance and the inter-quartile range of the new set of numbers.

	Mean	Variance	Inter-quartile range
A.	120	27	69
B.	120	81	69
C.	135	27	54
D.	135	81	54

45. Let A be a group of numbers $\{\alpha, \beta, \gamma, \delta\}$ and B be another group of numbers $\{\alpha+2, \beta+2, \mu+2, \gamma+2, \delta+2\}$, where $\alpha < \beta < \mu < \gamma < \delta$. Which of the following must be true?

I. The median of A is smaller than that of B.
II. The range of A and the range of B are the same.
III. The standard deviation of A is greater than that of B.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

END OF PAPER