2017-DSE
MATH CP

PAPER 2

MC

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION 2017

MATHEMATICS Compulsory Part
PAPER 2

11.30 am – 12.45 pm (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. $3m^2-5mn+2n^2+m-n=$

   A. $(m-n)(3m-2n+1)$.

   B. $(m-n)(3m+2n+1)$.

   C. $(m+n)(3m-2n-1)$.

   D. $(m+n)(3m+2n-1)$.

2. $\left(\frac{1}{9^{555}}\right)3^{444}=$

   A. 0 .

   B. $\frac{1}{3^{111}}$.

   C. $\frac{1}{3^{222}}$.

   D. $\frac{1}{3^{666}}$.

3. If $\frac{a+4b}{2a}=2+\frac{b}{a}$, then $a=$

   A. $\frac{2b}{3}$.

   B. $\frac{3b}{2}$.

   C. $\frac{5b}{6}$.

   D. $\frac{6b}{5}$.

4. $\frac{1}{\pi^4} =$

A. 0.0102 (correct to 3 significant figures).

B. 0.01025 (correct to 4 significant figures).

C. 0.01026 (correct to 5 decimal places).

D. 0.010266 (correct to 6 decimal places).

5. The solution of $6-x<2x-3$ or $7-3x>1$ is

A. $x<2$.

B. $x>3$.

C. $2<x<3$.

D. $x<2$ or $x>3$.

6. Let k be a constant. If $f(x)=2x^2-5x+k$, then $f(2)-f(-2)=$

A. -20 .

B. 0 .

C. 16 .

D. $2k$.

7. Let $p(x)=2x^2-11x+c$, where c is a constant. If $p(x)$ is divisible by $x-7$, find the remainder when $p(x)$ is divided by $2x+1$.

A. -26

B. -15

C. 15

D. 26

Go on to the next page

8. If m and n are constants such that $4x^2 + m(x+1) + 28 \equiv mx(x+3) + n(x-4)$, then $n =$

A. -8.

B. -7.

C. 4.

D. 16.

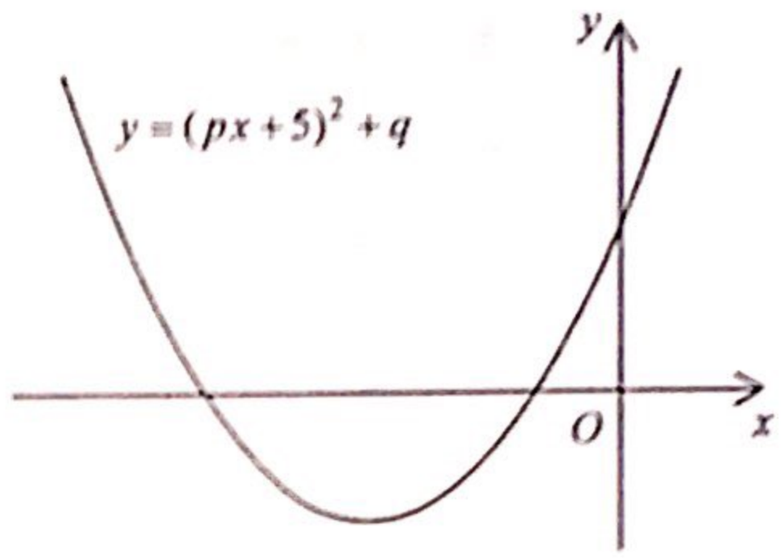
9. The figure shows the graph of $y = (px+5)^2 + q$, where p and q are constants. Which of the following is true?

A. $p < 0$ and $q < 0$

B. $p < 0$ and $q > 0$

C. $p > 0$ and $q < 0$

D. $p > 0$ and $q > 0$



10. A sum of $\$2\,000$ is deposited at an interest rate of 5% per annum for 4 years, compounded half-yearly. Find the interest correct to the nearest dollar.

A. $\$400$

B. $\$431$

C. $\$437$

D. $\$440$

11. The scale of a map is $1:20\,000$. If the area of a zoo on the map is $4\ \text{cm}^2$, then the actual area of the zoo is

A. $8\times10^4\ \text{m}^2$.

B. $1.6\times10^5\ \text{m}^2$.

C. $3.2\times10^5\ \text{m}^2$.

D. $1\times10^6\ \text{m}^2$.

12. It is given that y is the sum of two parts, one part is a constant and the other part varies as x^2. When $x=1$, $y=7$ and when $x=2$, $y=13$. If $x=3$, then $y=$

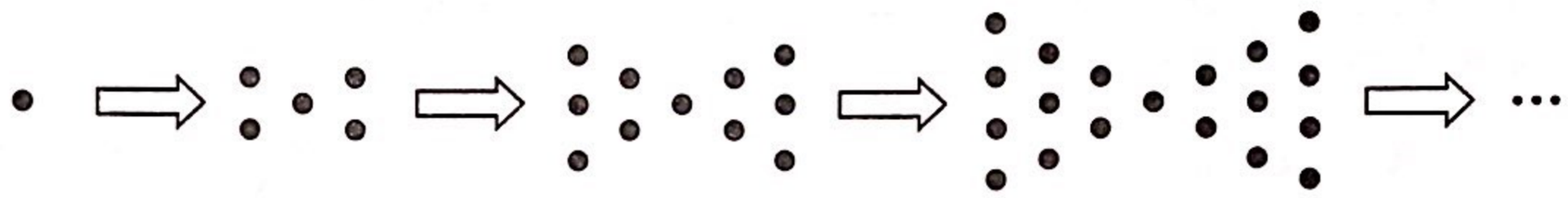
A. 19.

B. 20.

C. 23.

D. 47.

13. In the figure, the 1st pattern consists of 1 dot. For any positive integer n, the $(n+1)$th pattern is formed by adding $(2n+2)$ dots to the nth pattern. Find the number of dots in the 7th pattern.



A. 41

B. 55

C. 71

D. 161

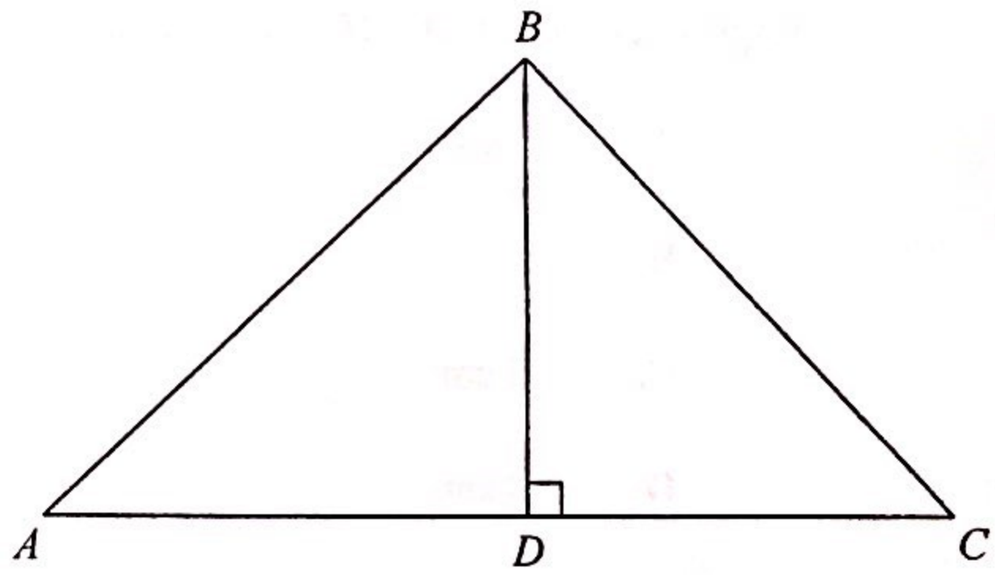
14. In the figure, D is a point lying on AC such that BD is perpendicular to AC. It is given that $AC=14$ cm and $BD=12$ cm. If the area of ΔABD is greater than the area of ΔBCD by $24\ \text{cm}^2$, then the perimeter of ΔABC is

A. 30 cm.

B. 42 cm.

C. 54 cm.

D. 84 cm.



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15. The base radius of a right circular cone is 2 times the base radius of a right circular cylinder while the height of the circular cylinder is 3 times the height of the circular cone. If the volume of the circular cone is $36\pi \text{ cm}^3$, then the volume of the circular cylinder is

A. $27\pi \text{ cm}^3$.

B. $48\pi \text{ cm}^3$.

C. $81\pi \text{ cm}^3$.

D. $144\pi \text{ cm}^3$.

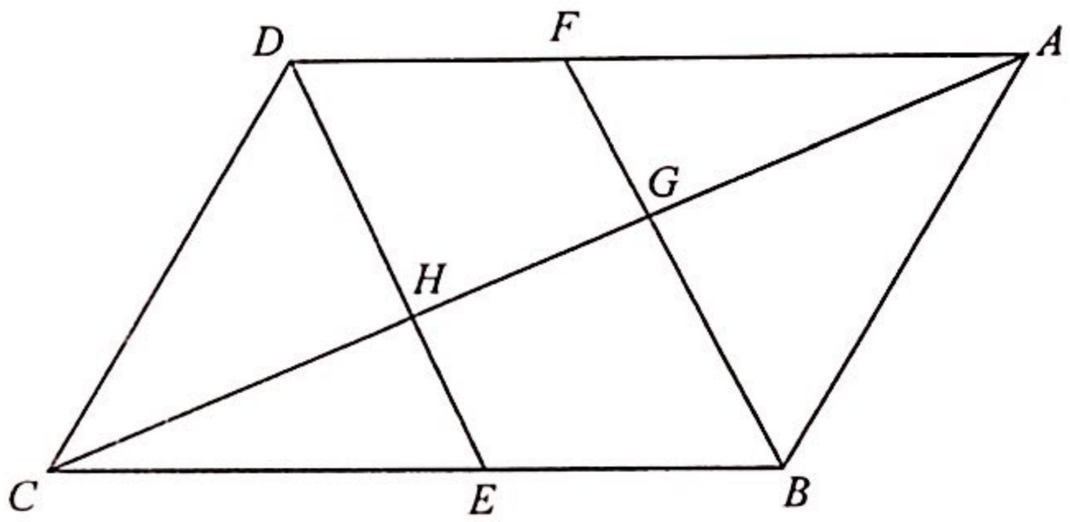
16. In the figure, $ABCD$ and $BEDF$ are parallelograms. E is a point lying on BC such that $BE : EC = 2 : 3$. AC cuts BF and DE at G and H respectively. If the area of ΔABG is 135 cm^2, then the area of the quadrilateral $DFGH$ is

A. 60 cm^2.

B. 81 cm^2.

C. 90 cm^2.

D. 144 cm^2.



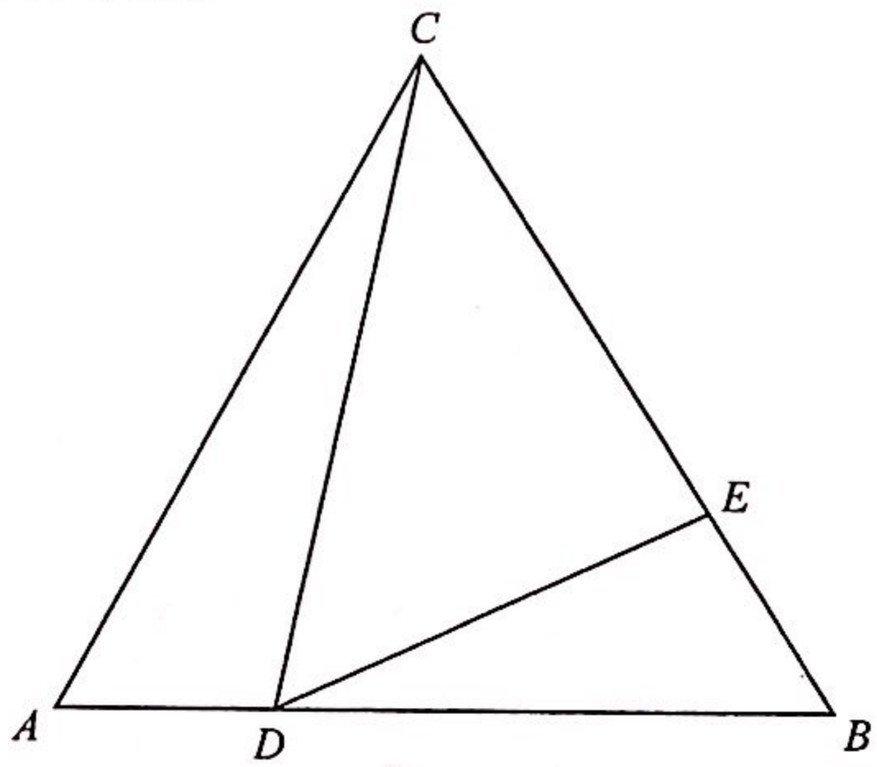
17. In the figure, ABC is an equilateral triangle of side 16 cm. D and E are points lying on AB and BC respectively such that $AD = 4 \text{ cm}$ and $\angle CDE = 60°$. Find CE.

A. 9 cm

B. 10 cm

C. 12 cm

D. 13 cm



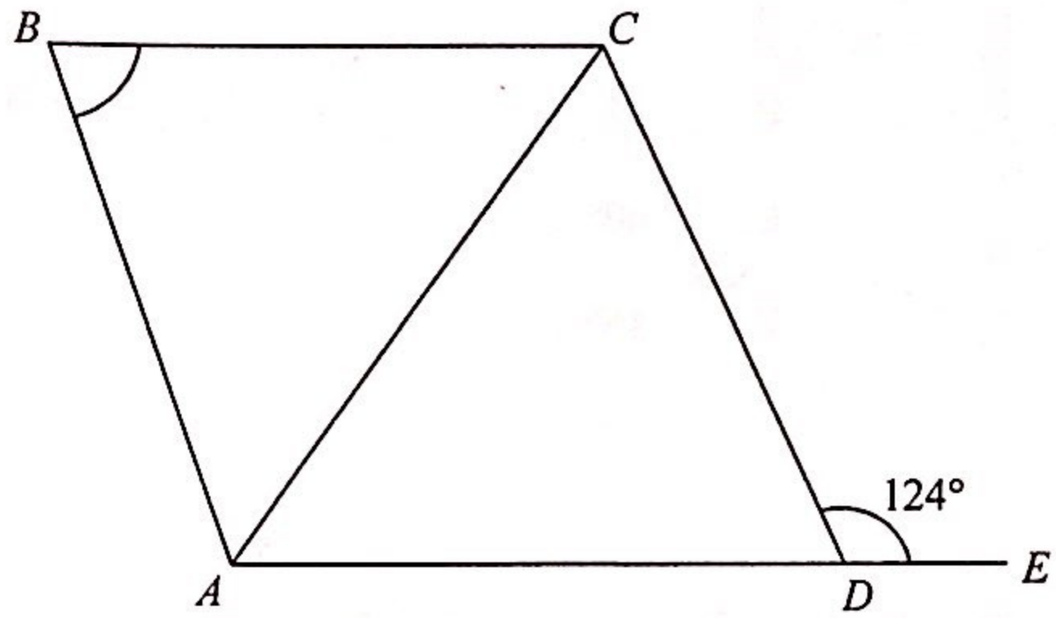
18. In the figure, $AB = BC$ and D is a point lying on AE such that $AC = AD$. If $AE // BC$, then $\angle ABC =$

A. $44°$.

B. $56°$.

C. $62°$.

D. $68°$.



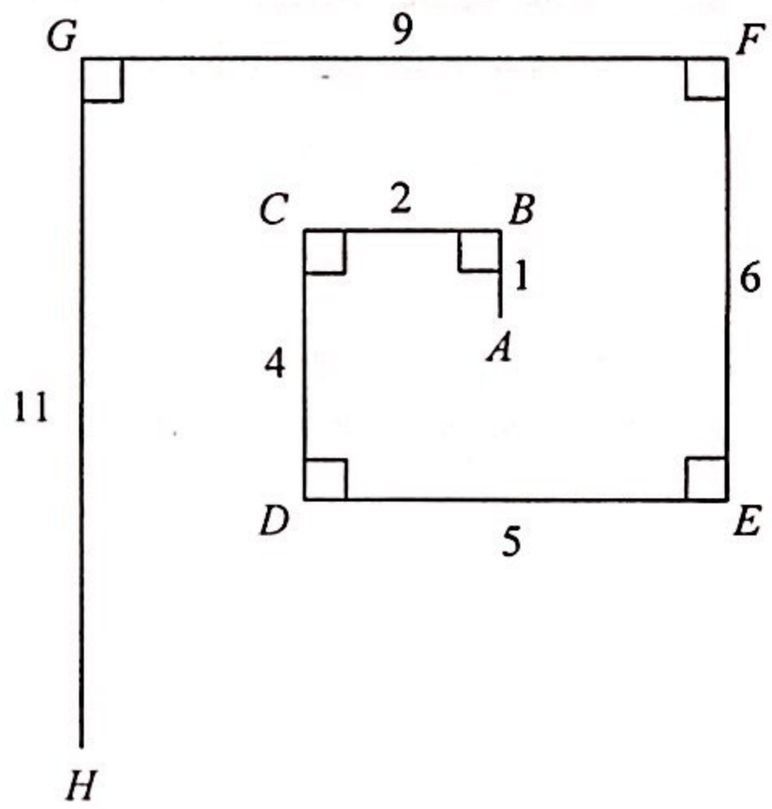
19. In the figure, the length of the line segment joining A and H is

A. 6.

B. 8.

C. 9.

D. 10.



20. $ABCD$ is a parallelogram. Let E be the mid-point of AD. If $\angle ABE = \angle CBD = \angle DBE$, which of the following are true?

I. $AB = BD$

II. $\angle ABC = 135°$

III. $\Delta ABE \cong \Delta DBE$

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

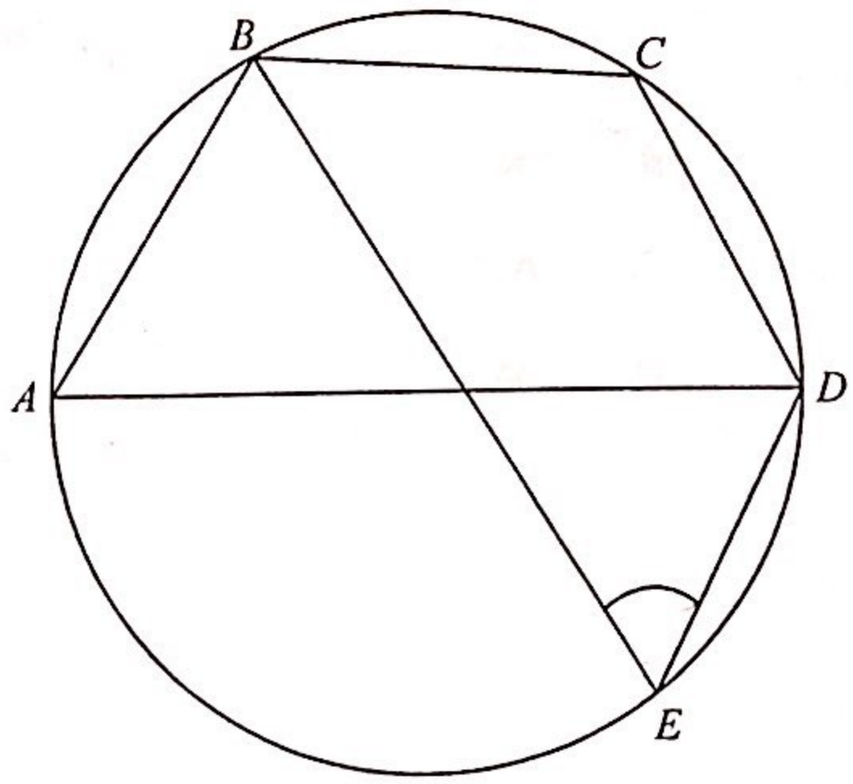
21. In the figure, AD is a diameter of the circle $ABCDE$. If $BC = CD$ and $\angle ABC = 110°$, then $\angle BED =$

A. $20°$.

B. $35°$.

C. $40°$.

D. $55°$.



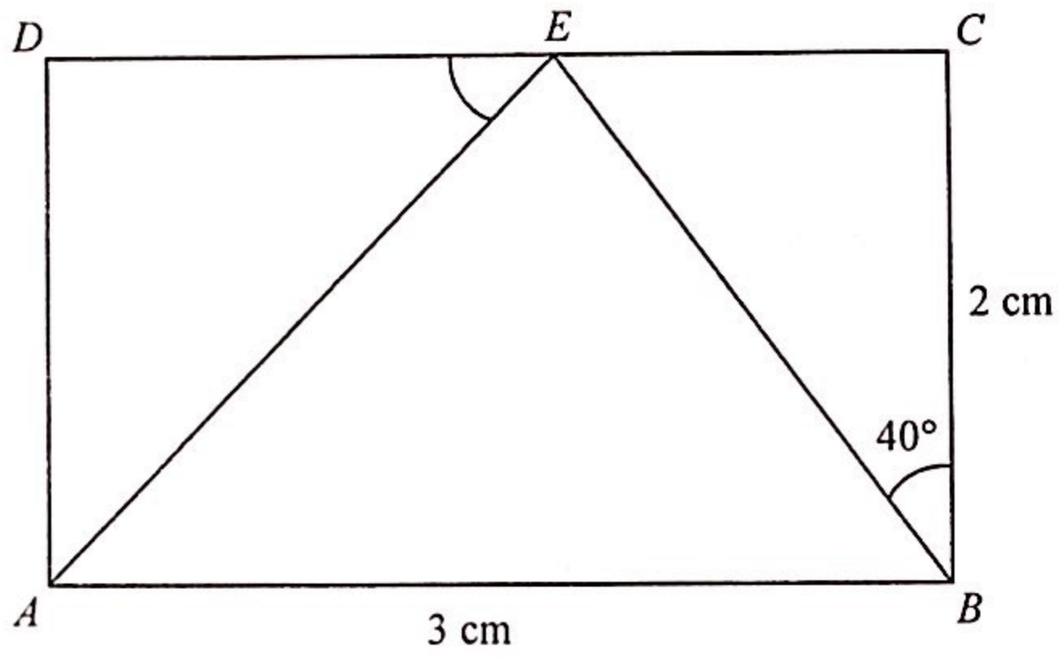
22. In the figure, $ABCD$ is a rectangle. If E is a point lying on CD such that $\angle CBE = 40°$, find $\angle AED$ correct to the nearest degree.

A. $33°$

B. $43°$

C. $47°$

D. $57°$



23. In the figure, the equations of the straight lines L_1 and L_2 are $x + my = n$ and $x + py = q$ respectively. Which of the following are true?

I. $m < p$

II. $n > q$

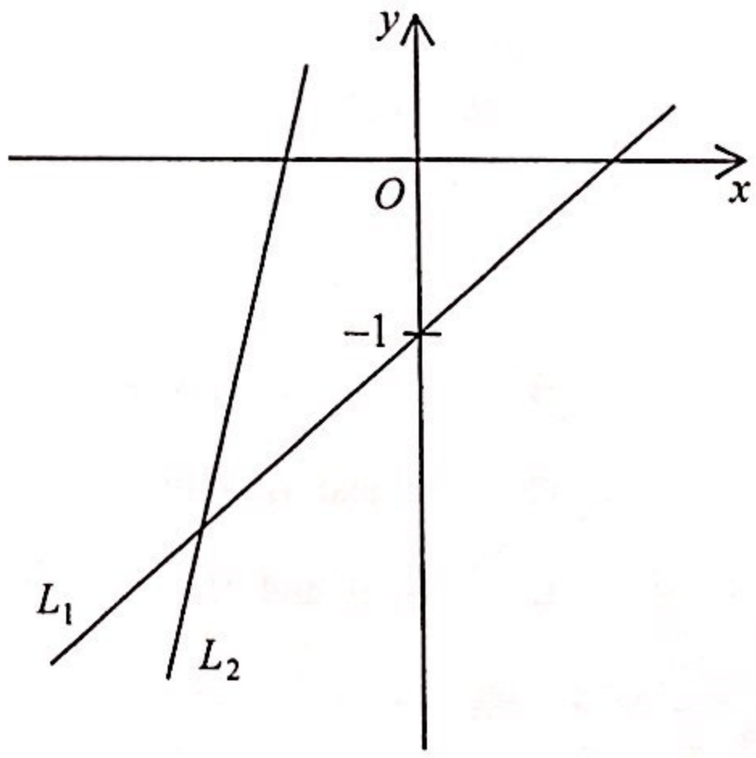
III. $n + m < p + q$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III



24. The straight line L is perpendicular to the straight line $9x-5y+45=0$. If the x-intercept of L is -3, then the equation of L is

A. $5x+9y+15=0$.

B. $5x+9y+27=0$.

C. $9x-5y+15=0$.

D. $9x-5y+27=0$.

25. The polar coordinates of the points P, Q and R are $(3,160°)$, $(4,280°)$ and $(6,340°)$ respectively. The perpendicular distance from Q to PR is

A. 2.

B. 3.

C. $2\sqrt{3}$.

D. $3\sqrt{3}$.

26. The equations of the circles C_1 and C_2 are $x^2+y^2+8x-4y-5=0$ and $2x^2+2y^2+8x-4y-5=0$ respectively. Let G_1 and G_2 be the centres of C_1 and C_2 respectively. Denote the origin by O. Which of the following is/are true?

I. G_1, G_2 and O are collinear.
II. The radii of C_1 and C_2 are equal.
III. O is equidistant from G_1 and G_2.

A. I only

B. II only

C. I and III only

D. II and III only

27. It is given that A and B are two distinct points lying on the circle $x^2+y^2-6x-4y-87=0$. Let P be a moving point in the rectangular coordinate plane such that $AP=BP$. The equation of the locus of P is $x+2y+k=0$, where k is a constant. Find k.

A. -8

B. -7

C. 7

D. 8

Go on to the next page

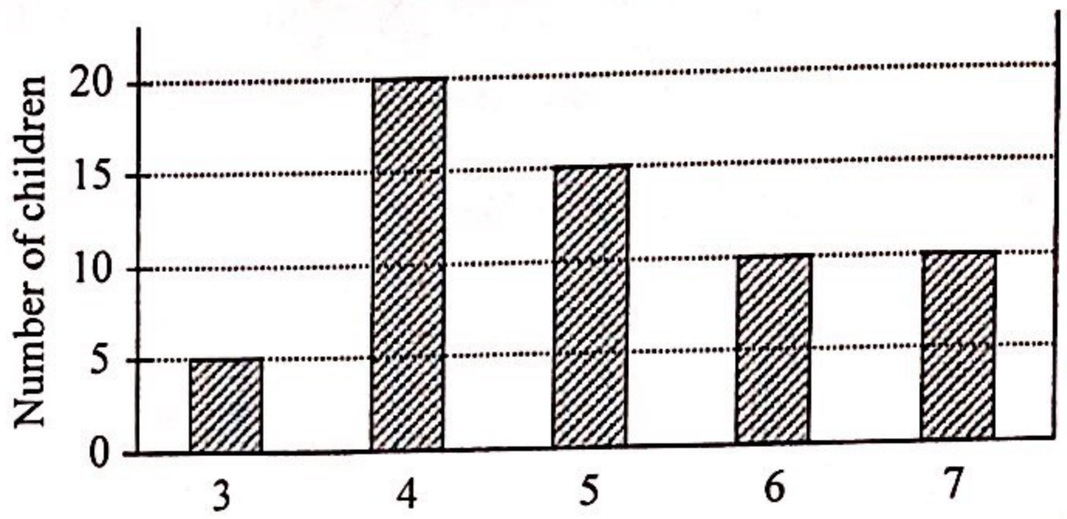
28. The bar chart below shows the distribution of the numbers of tokens got by a group of children in a game. If a child is randomly selected from the group, find the probability that the selected child gets fewer than 5 tokens in the game.

A. $\frac{2}{3}$

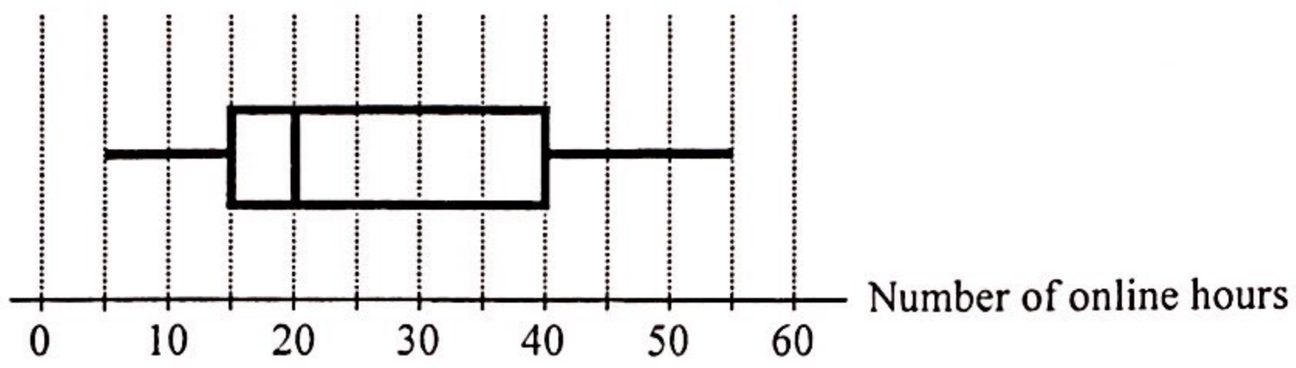
B. $\frac{2}{5}$

C. $\frac{5}{12}$

D. $\frac{7}{25}$



29. The box-and-whisker diagram below shows the distribution of the numbers of online hours spent by a class of students in a certain week. Find the lower quartile of the distribution.



A. 5

B. 15

C. 25

D. 40

30. Consider the following positive integers:

2 3 4 6 7 9 10 m n

Let a, b and c be the mode, the median and the range of the above positive integers respectively. If the mean of the above positive integers is 5, which of the following must be true?

I. $a = 2$
II. $b = 4$
III. $c = 8$

A. I only

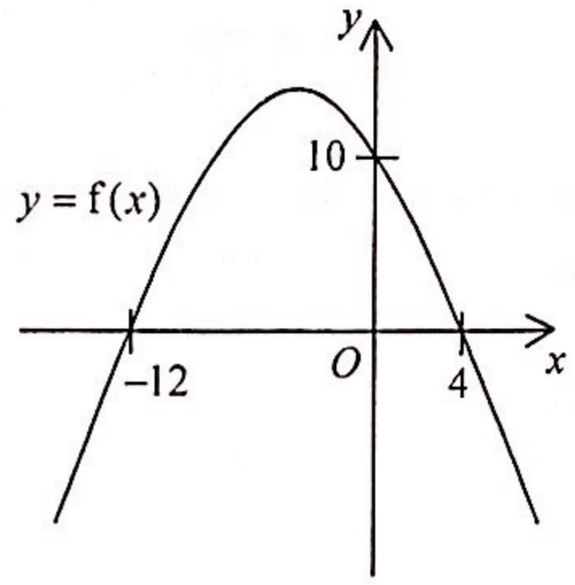
B. II only

C. I and III only

D. II and III only

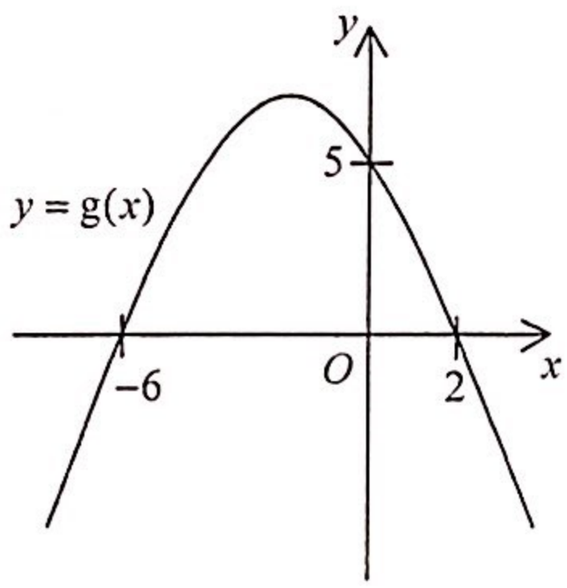
Section B

31.

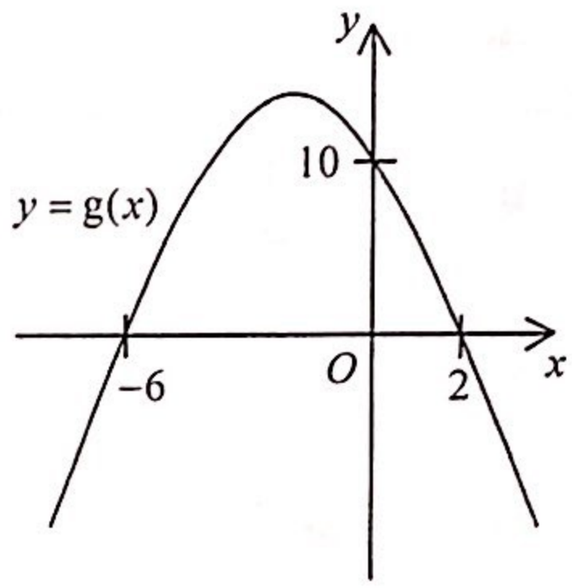


The figure above shows the graph of $y = f(x)$. If $g(x) = f\left(\frac{x}{2}\right)$, which of the following may represent the graph of $y = g(x)$?

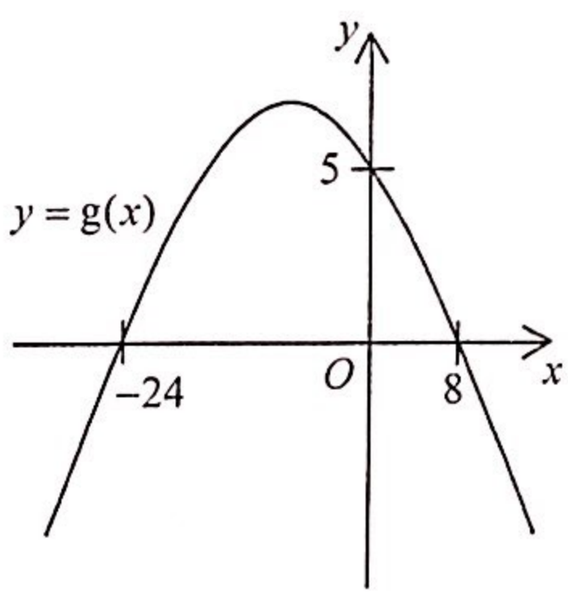
A.



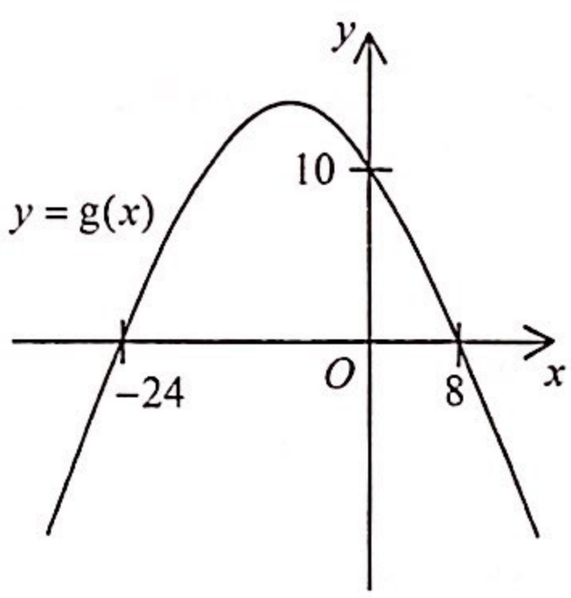
B.



C.



D.



32. $8^3 + 8^{19} =$

A. 100000000000_{16} .

B. 200000000000_{16} .

C. 1000000000100_{16} .

D. 2000000000200_{16} .

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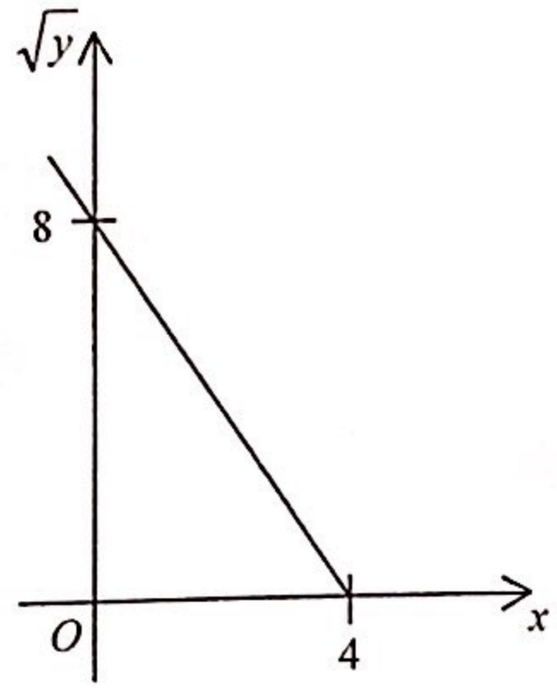
33. The graph in the figure shows the linear relation between x and $\sqrt{y}$. Which of the following must be true?



A. $y = x^2 - 4x + 8$

B. $y = x^2 + 4x + 8$

C. $y = 4x^2 - 32x + 64$

D. $y = 4x^2 + 32x + 64$

34. If $\begin{cases} \log_9 y = x - 3 \\ 2(\log_9 y)^2 = 4 - x \end{cases}$, then $y =$

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

B. 1 or $\frac{1}{3}$.

C. 2 or $\frac{7}{2}$.

D. 3 or $\frac{1}{9}$.

35. If k and $\frac{5}{2-i} + ki$ are real numbers, then $k =$

A. -2.

B. -1.

C. 1.

D. 2.

36. Which of the following are arithmetic sequences?

I. $\pi^{30}, \pi^{45}, \pi^{60}$
II. $30\pi, 45\pi, 60\pi$
III. $\pi - 30, \pi - 45, \pi - 60$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

37. Consider the following system of inequalities:

$$\begin{cases} y \le 9 \\ x - y - 9 \le 0 \\ x + y - 9 \ge 0 \end{cases}$$

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 $x - 2y + 43$ is

A. 25.

B. 43.

C. 52.

D. 61.

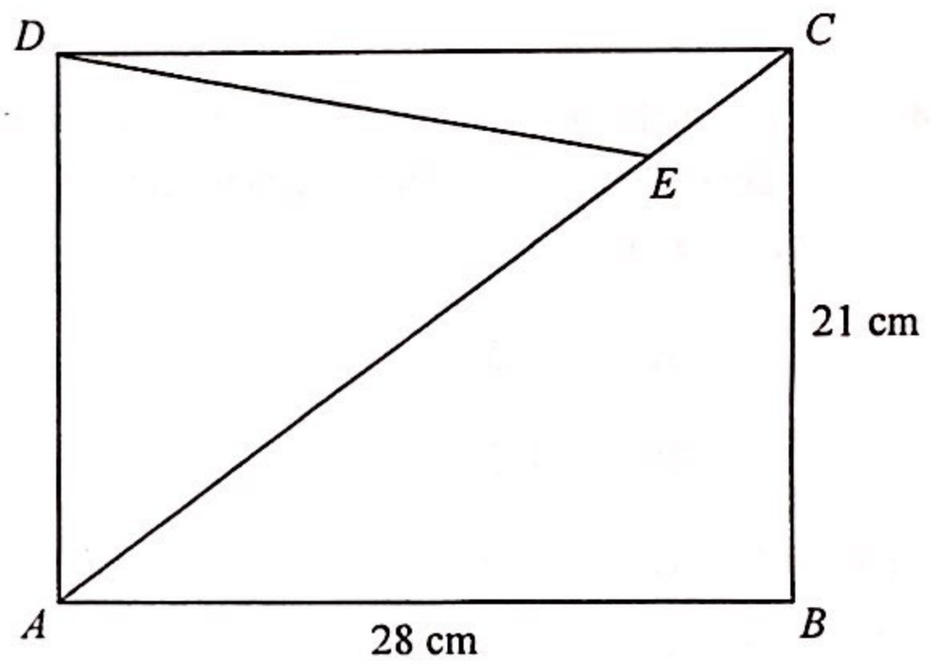
38. In the figure, $ABCD$ is a rectangle. If E is a point lying on AC such that $AE = 30$ cm, then $DE =$

A. $3\sqrt{65}$ cm.

B. $5\sqrt{29}$ cm.

C. $\sqrt{641}$ cm.

D. $\sqrt{697}$ cm.



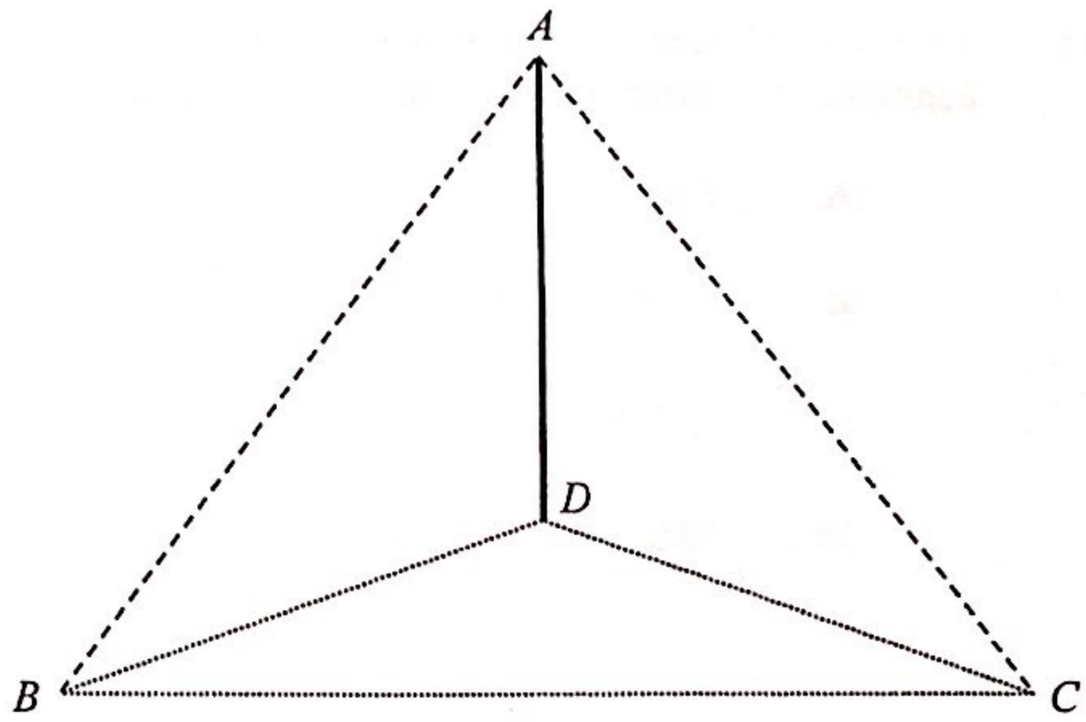
39. In the figure, AD is a vertical pole standing on the horizontal ground BCD. If $AB = 25$ m, $AD = 15$ m, $BC = 29$ m and $CD = 21$ m, find the angle between AB and the plane ACD correct to the nearest degree.

A. 53°

B. 54°

C. 69°

D. 70°



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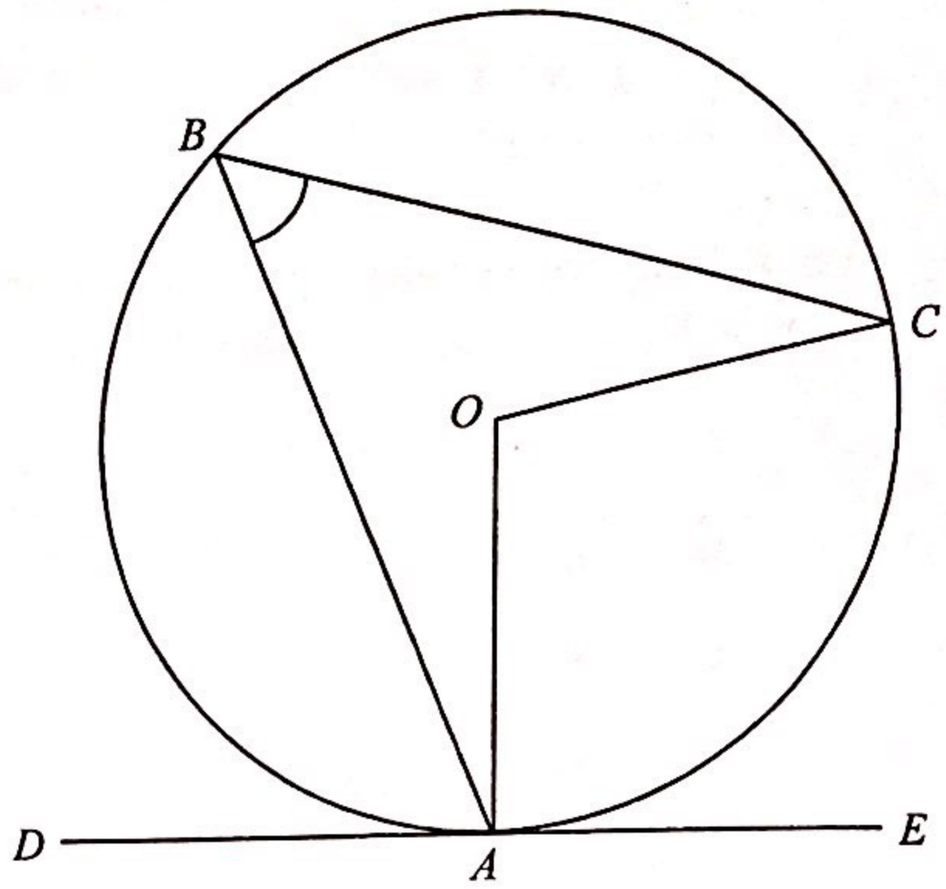
40. In the figure, O is the centre of the circle ABC. DE is the tangent to the circle at A. If $\angle BAD = 68°$ and $\angle BCO = 26°$, then $\angle ABC =$



A. $42°$.

B. $48°$.

C. $54°$.

D. $64°$.

41. Let O be the origin. The coordinates of the points P and Q are $(p, 0)$ and $(0, q)$ respectively, where p and q are positive numbers. If the in-centre of ΔOPQ lies on the straight line $3x + 4y = 3p$, then $p : q =$

A. $2:3$.

B. $4:3$.

C. $4:9$.

D. $7:24$.

42. There are 13 students and 6 teachers in a committee. If 5 students and 4 teachers are selected from the committee to form a team, how many different teams can be formed?

A. 4 290

B. 19 305

C. 92 378

D. 55 598 400

43. When Teresa throws a dart, the probability that she hits the target is 0.7 . If Teresa throws the dart 4 times, find the probability that she hits the target at most 3 times.

A. 0.0081

B. 0.2401

C. 0.7599

D. 0.9919

44. The standard score of Tom in a Mathematics examination is -2 . If the score of Tom in the Mathematics examination is 33 marks and the mean of the scores of the Mathematics examination is 45 marks, then the standard deviation of the scores of the Mathematics examination is

A. 3 marks.

B. 6 marks.

C. 12 marks.

D. 36 marks.

45. Let m_1 , r_1 and v_1 be the mode, the inter-quartile range and the variance of a group of numbers $\{x_1, x_2, x_3, x_4, x_5, x_6, x_7\}$ respectively while m_2 , r_2 and v_2 be the mode, the inter-quartile range and the variance of the group of numbers $\{8x_1, 8x_2, 8x_3, 8x_4, 8x_5, 8x_6, 8x_7\}$ respectively. Which of the following must be true?

I. $m_2 = 8m_1$

II. $r_2 = 8r_1$

III. $v_2 = 8v_1$

A. I and II only

B. I and III only

C. II and III only

D. I , II and III

END OF PAPER