

**Mathematics**

Board Exam 2023

Sample Paper No. 2

Class 10<sup>th</sup>

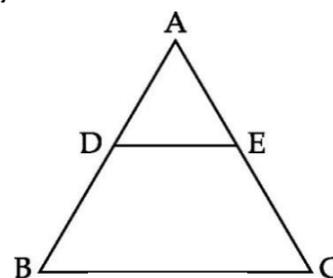
Time: 3 h

Marks: 80

Section	A	B	C	D	E
Q. No.	1 – 20	21 – 25	26 – 31	32 – 35	36 – 38
Marks	1	2	3	5	4
Type	MCQ	S. A. Type 1	S. A. Type 2	L. A. Type	Case Study Based

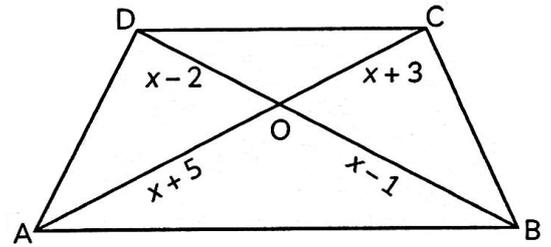
**Section A**

- Given that  $HCF(2520, 6600) = 40$ ,  $LCM(2520, 6600) = 252 \times k$ , then the value of  $k$  is:  
 (a) 1650                      (b) 1600                      (c) 165                      (d) 1625
- The roots of the equation  $x^2 - \sqrt{3}x - x + \sqrt{3} = 0$  are:  
 (a)  $\sqrt{3}, 1$                       (b)  $-\sqrt{3}, 1$                       (c)  $-\sqrt{3}, -1$                       (d)  $\sqrt{3}, -1$
- The quadratic polynomial having zeroes are 1 and -2 is:  
 (a)  $x^2 - x + 2$                       (b)  $x^2 - x - 2$                       (c)  $x^2 + x - 2$                       (d)  $x^2 + x + 2$
- If the pair of linear equations  $a_1x + b_1y + c_1 = 0$  and  $a_2x + b_2y + c_2 = 0$  has infinite Number of solutions, then the relation among the coefficients is:  
 (a)  $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$                       (b)  $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$                       (c)  $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$                       (d)  $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} = \frac{c_1}{c_2}$
- The ratio in which the line segment joining the points A(6, 4) and B(1, -7) is divided by the x-axis is:  
 (a) 6 : 1                      (b) 2 : 7                      (c) 1 : 3                      (d) 4 : 7
- In figure given below,  $DE \parallel BC$ , if  $AB = 5.6$  cm,  $AD = 1.6$  cm, then  $AE : EC$  is  
 (a) 2 : 5                      (b) 5 : 2                      (c) 2 : 7                      (d) 7 : 2



- If  $\tan A = \frac{5}{12}$ , find the value of  $(\sin A + \cos A) \times \sec A$   
 (a)  $\frac{6}{13}$                       (b)  $\frac{7}{12}$                       (c)  $\frac{17}{12}$                       (d)  $\frac{12}{17}$
- If  $\sin A = \frac{1}{2}$  and  $\cos B = \frac{1}{2}$ , then the value of  $(A + B)$  is equal to  
 (a)  $0^\circ$                       (b)  $60^\circ$                       (c)  $90^\circ$                       (d)  $30^\circ$
- In  $\triangle DEF$  and  $\triangle PQR$ , it is given that  $\angle D = \angle Q$  and  $\angle R = \angle E$ , then which of the following is not true?  
 (a)  $\frac{EF}{PR} = \frac{DF}{PQ}$                       (b)  $\frac{DE}{PQ} = \frac{EF}{RP}$                       (c)  $\frac{DE}{QR} = \frac{DF}{PQ}$                       (d)  $\frac{EF}{RP} = \frac{DE}{QR}$

10. Evaluate for  $x$  if  $AB \parallel DC$  in the given figure  
 (a) 6 (b) 7 (c) 8 (d) 4



11. If tangents PA and PB from an external point P to a circle with centre O are inclined to each other at an angle of  $80^\circ$ , then  $\angle POA$  is equal to  
 (a)  $50^\circ$  (b)  $60^\circ$  (c)  $70^\circ$  (d)  $80^\circ$
12. The number of rounds that a wheel of diameter  $7/11$  m will make in going 4 km is:  
 (a) 1500 (b) 1700 (c) 2000 (d) 2500
13. The radii of the bases of a cylinder and a cone are in the ratio 3 : 4 and their heights are in the ratio 2 : 3, then the ratio between the volume of cylinder to that of cone is:  
 (a) 8 : 9 (b) 9 : 8 (c) 5 : 7 (d) 7 : 5
14. The mean of the following data is: 45, 35, 20, 30, 15, 25, 40  
 (a) 15 (b) 25 (c) 35 (d) 30
15. The radius of a circle whose circumference is equal to the sum of the circumferences of two circles of diameters 36 cm and 20 cm is:  
 (a) 56 cm (b) 42 cm (c) 28 cm (d) 16 cm
16. The median of the following data is:

$x$	10	20	30	40	50
$f$	2	3	2	3	1

- (a) 30 (b) 40 (c) 35 (d) 31
17. If  $P(E) = 0.07$ , then what is the probability of 'not E'?  
 (a) 0.93 (b) 0.95 (c) 0.89 (d) 0.90
18. If  $\sin\theta = \frac{1}{3}$ , then the value of  $2 \cot^2\theta + 2$  is:  
 (a) 6 (b) 9 (c) 18 (d) 4

**DIRECTIONS:** In the question number 19 and 20, a statement of **assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option.

- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).  
 (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A).  
 (c) Assertion (A) is true but reason (R) is false.  
 (d) Assertion (A) is false but reason (R) is true.

19. **Assertion (A):** If  $\alpha$  and  $\beta$  are the zeroes of the polynomial  $x^2 + 2x - 15$ , then  $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{2}{15}$ .

**Reason (R):** If  $\alpha$  and  $\beta$  are the zeroes of a quadratic polynomial  $ax^2 + bx + c$ , then  $\alpha + \beta = -\frac{b}{a}$

and  $\alpha\beta = \frac{c}{a}$ .

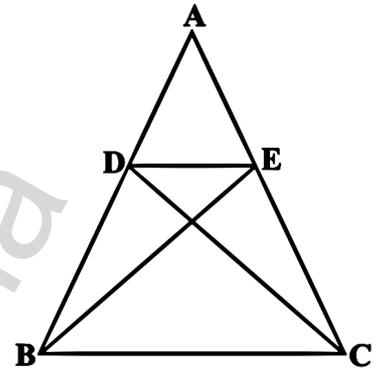
20. **Assertion (A):** Points (3, 2), (-2, -3) and (2, 3) form a right triangle.

**Reason (R):** If (x, y) is equidistant from (3, 6) and (-3, 4), then  $3x + y = 5$ .

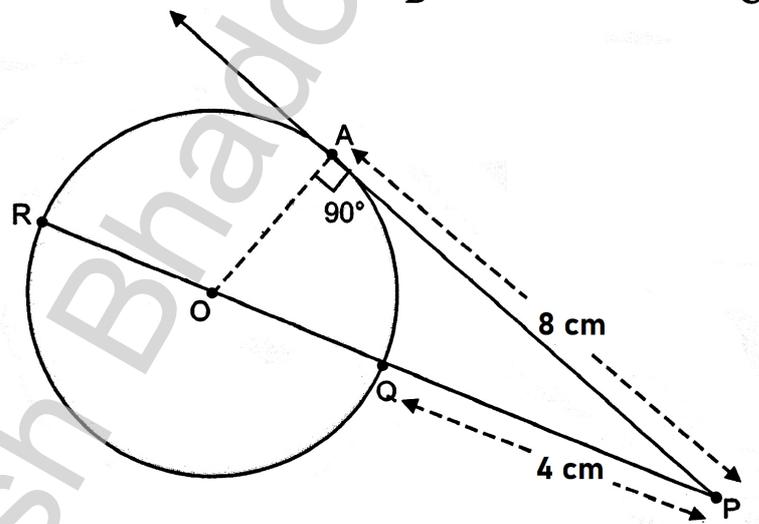
### Section B

21. Solve:  $148x + 231y = 527$ ;  $231x + 148y = 610$ .

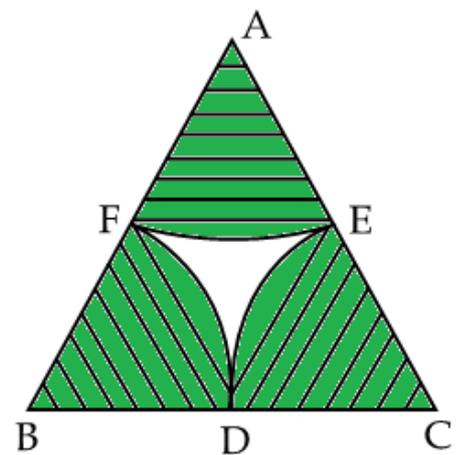
22. In Fig. given, if  $\triangle ABE \cong \triangle ACD$ , show that  $\triangle ADE \sim \triangle ABC$ .



23. In figure, O is the centre of the circle and PA is tangent drawn to the circle from the point P. Secant PQR passes through the centre O of the circle. If  $PA = 8$  cm and  $PQ = 4$  cm, find the radius of the circle.



24. In fig., arcs are drawn by taking vertices A, B and C of an equilateral triangle of side 10 cm, to intersect the sides BC, CA and AB at their respective mid-points D, E and F. Find the area of the shaded region. (Use  $\pi = 3.14$ )



25. In right angled  $\triangle ABC$ ,  $\angle A = \theta$  and  $\angle B = 90^\circ$ .

If  $\sin \theta = \frac{3}{4}$ , show that  $\sqrt{\frac{\operatorname{cosec}^2 \theta - \cot^2 \theta}{\sec^2 \theta - 1}} = \frac{\sqrt{7}}{3}$

## Section C

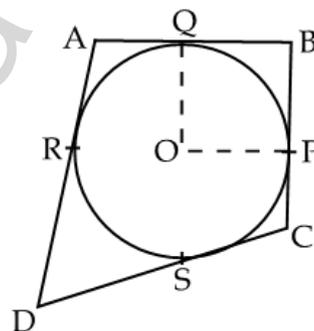
26. An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

27. If  $\alpha, \beta$  are zeroes of  $2x^2 - 3x + 7$ , then find: (i)  $\frac{1}{\alpha} + \frac{1}{\beta}$       (ii)  $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$       (iii)  $\alpha^2 + \beta^2$

28. If the equation  $(1 + m^2)n^2x^2 + 2mncx + (c^2 - a^2) = 0$  has equal roots, prove that:  $c^2 = a^2(1 + m^2)$ .

29. Prove that:  $\frac{\tan \theta}{1 - \cot \theta} + \frac{\cot \theta}{1 - \tan \theta} = 1 + \sec \theta \cdot \operatorname{cosec} \theta$ .

30. In the given figure, a circle is inscribed in a quadrilateral ABCD in which  $\angle B = 90^\circ$ . If  $AD = 23$  cm,  $AB = 29$  cm and  $DS = 5$  cm, find the radius  $r$  of the circle.



31. All the three face cards of spades are removed from a well-shuffled pack of 52 cards. A card is then drawn at random from the remaining pack. Find the probability of getting:

- (i) a black face card      (ii) a queen      (iii) a black card

## Section D

32. Two pipes running together can fill a tank in 6 minutes. If one pipe takes 5 minutes more than the other to fill the tank, find the time in which each pipe would fill the tank separately.

33. Prove that the lengths of tangents drawn from an external point to a circle are equal.

34. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest  $\text{cm}^2$ . (use  $\pi = \frac{22}{7}$ )

35. Find the mean and mode of the following frequency distribution.

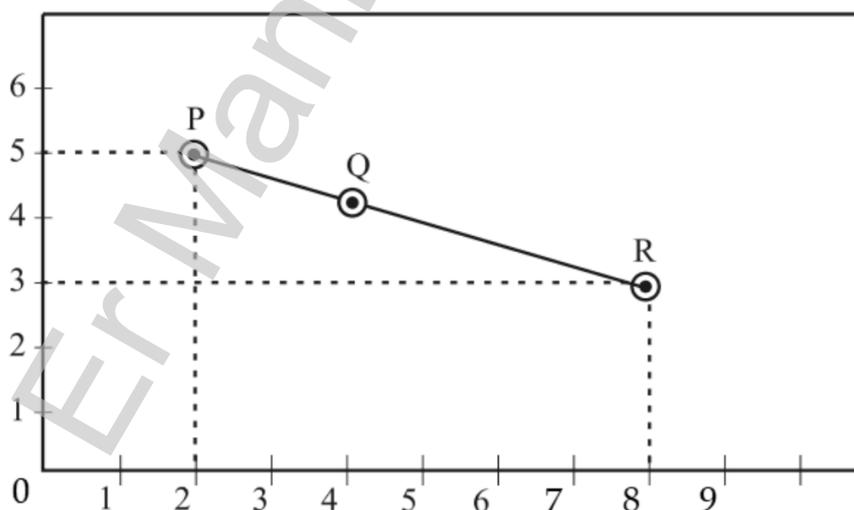
<b>Classes</b>	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25
<b>Frequency</b>	6	8	10	6	4

## Section E

36. Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of ₹ 1,18,000 by paying every month starting with the first installment of ₹ 1000. If he increases the installment by ₹ 100 every month, answer the following:



- (a) How much is the amount paid by him in 30<sup>th</sup> installment? (1 mark)  
 (b) How much amount is paid by him in the 30 installments? (1 mark)  
 (c) What amount does he still have to pay after 30th installment? (2 marks)
37. A group of Class X students goes to picnic during vacation. There were three different slides and three friends Ajay, Ram and Shyam are sliding in the three slides. The position of the three friends shown by P, Q and R in three different slides are given below:



Consider O as origin, answer the below questions:

- (i) Find the co-ordinates of the point 'Q' which divides the line segment PR in the ratio 1 : 2 internally. (1 mark)  
 (ii) Find the distance PR. (1 mark)  
 (iii) Find the co-ordinates of point on x-axis which is at equal distance PQ. (2 marks)

38. A Satellite flying at height  $h$  is watching the top of the two tallest mountains in Uttarakhand and Karnataka, them being Nanda Devi (height 7,816m) and Mullayanagiri (height 1,930 m). The angles of depression from the satellite, to the top of Nanda Devi and Mullayanagiri are  $30^\circ$  and  $60^\circ$  respectively. If the distance between the peaks of two mountains is 1937 km, and the satellite is vertically above the midpoint of the distance between the two mountains.

- (a) What is the distance of the satellite from the top of Nanda Devi? (1 mark)  
(b) What is the distance of the satellite from the top of Mullayanagiri? (1 mark)  
(c) What is the height of the satellite above the ground? (2 marks)



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### Words of Wisdom

Whether you think you can or you think you can't, you're right.

- Henry Ford

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