



# APEEJAY SCHOOL, PANCHSHEEL PARK

Class – X  
Subject – Mathematics  
PREBOARD II EXAMINATION (2023-24)

Date: 10/01/2024  
M.M.: 80

Name of the student:  
Time Allowed: 3 hours

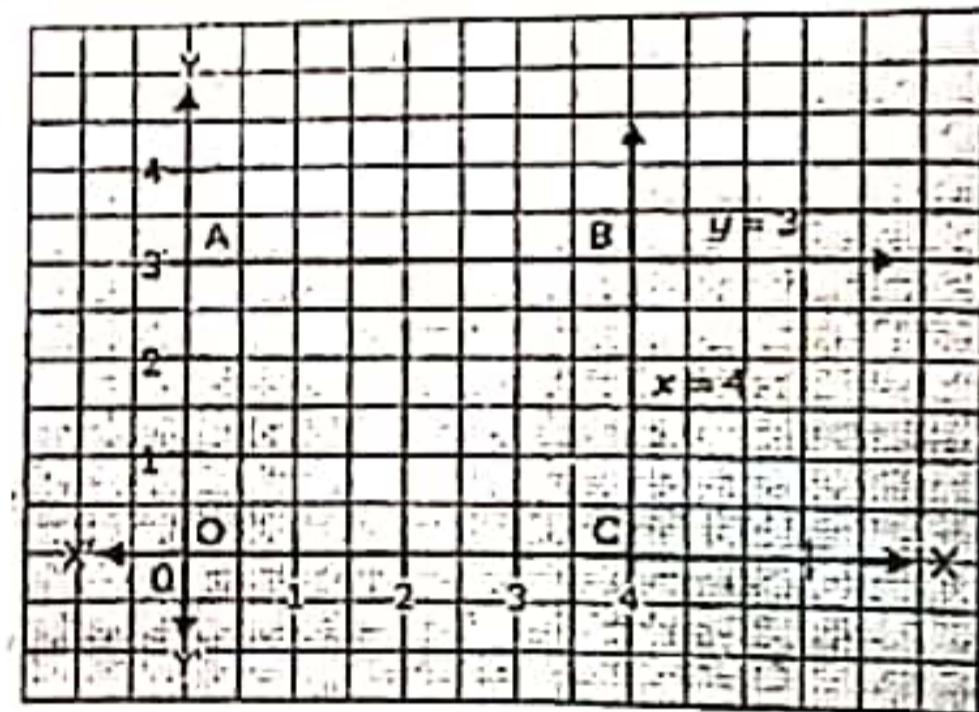
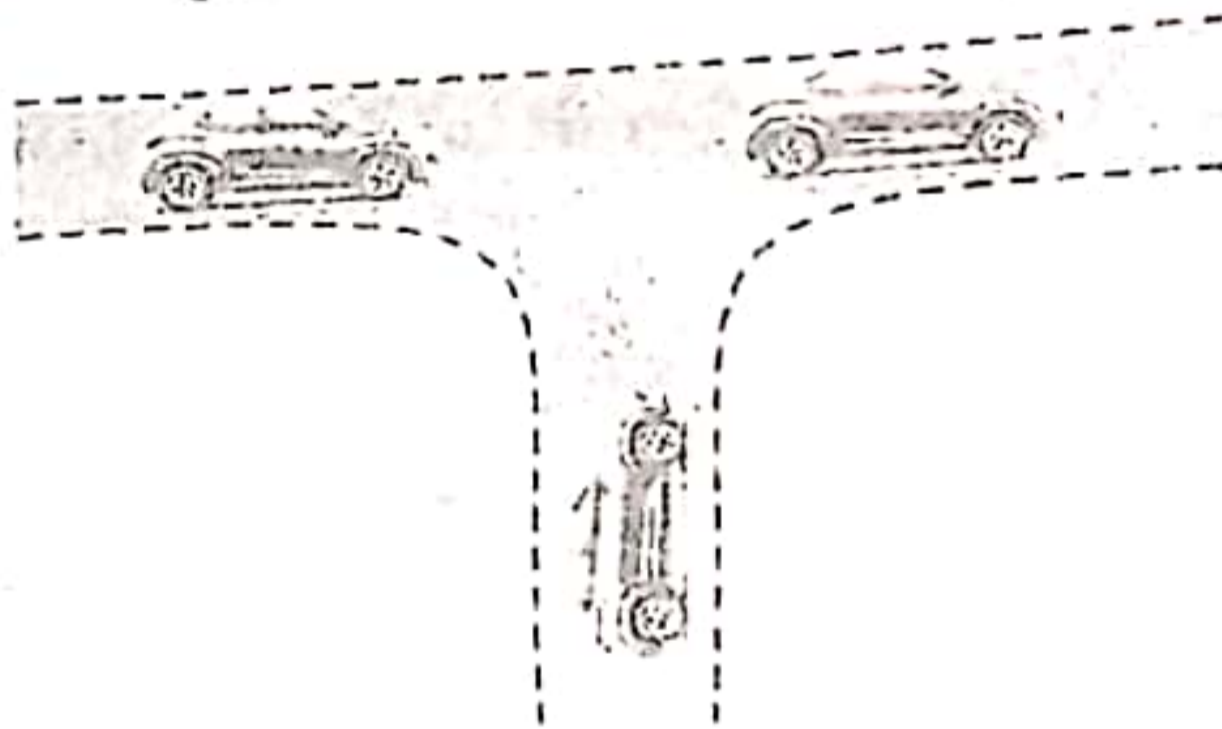
### General Instructions:

- i. This Question Paper has 5 Sections A-E.
- ii. Section A has 20 MCQs carrying 1 mark each
- iii. Section B has 5 questions carrying 02 marks each.
- iv. Section C has 6 questions carrying 03 marks each.
- v. Section D has 4 questions carrying 05 marks each.
- vi. Section E has 3 case-based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
- vii. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
- viii. Draw neat figures wherever required. Take  $\pi = 22/7$  wherever required if not stated.

### SECTION A

Section A consists of 20 questions of 1 mark each.

Q1. Two paths cross each other as shown in the figure..These two paths represent the pair of linear equations. Let the pair of linear equations be represented by the paths given by  $x = 4$  and  $y = 3$ .



The point of intersection of the pair of linear equations  $x = 4$  and  $y = 3$  is \_\_\_\_\_.

(a) (4,0)                      (b) (3,4)                      (c) (4,3)                      (d) (3,3)

Q2. The upper limit of the median class of the following frequency distribution is:

Class	Frequency
0-5	13
6-11	10
12-17	15
18-23	8
24-29	11

- (a) 17.5                      (b) 18.5                      (c) 19                      (d) 19.5

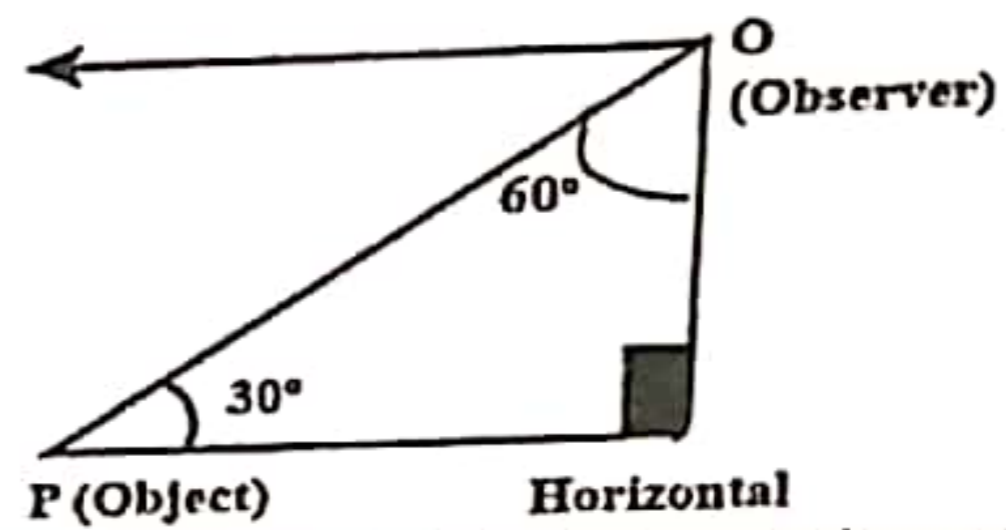


- Q3. The ratio of HCF and LCM of the least composite number and the least prime number is \_\_\_\_\_.  
 (a) 1:2 (b) 2:1 (c) 1:1 (d) 1:3
- Q4. The zeroes of the polynomial  $x^2 - 3x - m(m + 3)$  are \_\_\_\_\_.  
 (a)  $m, m + 3$  (b)  $-m, m + 3$  (c)  $m, -(m + 3)$  (d)  $-m, -(m + 3)$
- Q5. The number of revolutions made by a circular wheel of radius 0.7 m in rolling a distance of 176 m is \_\_\_\_\_.  
 (a) 22 (b) 24 (c) 75 (d) 40

- Q6. If the coordinates of the centre of the circle  $O(-4,3)$  and a point on the circle  $N(-2.4,1.8)$ , then radius of the circle is \_\_\_\_\_.  
 (a) 4 units (b) 2 units (c)  $\sqrt{0.4}$  units (d)  $\sqrt{42.4}$  units

- Q7. In a formula racing competition, the time taken by two racing cars A and B to complete 1 round of the track is 30 minutes and  $p$  minutes respectively. If the cars meet again at the starting point for the first time after 90 minutes and the  $\text{HCF}(30, p) = 15$ , then the value of  $p$  is \_\_\_\_\_ minutes.  
 (a) 45 (b) 60 (c) 75 (d) 180

- Q8. In the given figure, the positions of the observer and the object is mentioned, the angle of depression is \_\_\_\_\_.



- (a)  $60^\circ$  (b)  $30^\circ$   
 (c)  $45^\circ$  (d)  $90^\circ$

- Q9. Four groups in a class were asked to come up with an arithmetic progression. Shown below are their responses.

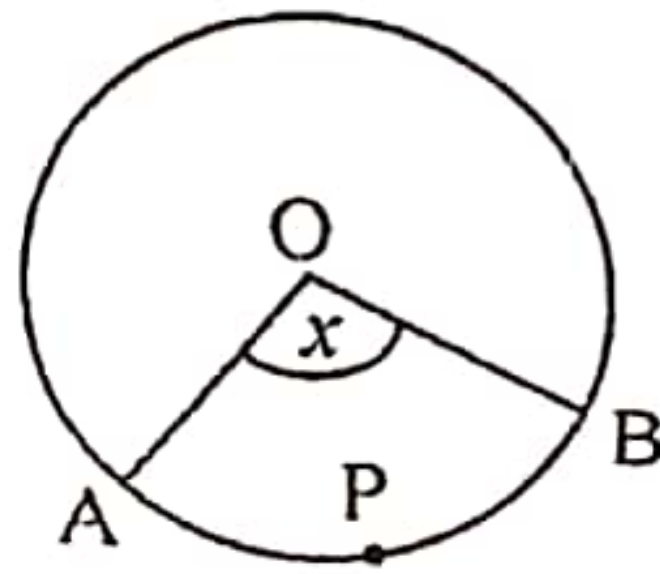
Groups	Arithmetic Progression
M	4, 2, 0, -2, ...
N	41, 38.5, 36, 33.5, ...
O	-19, -21, -23, -25, ...
P	-3, -3, -3, -3, ...

Which of these groups correctly came up with an AP?

- (a) only groups M and O (b) only groups N and O  
 (c) only Groups M, N and O (d) All groups
- Q10. The discriminant of the equation  $(x + 1)^3 = 4 - x + x^3$  is \_\_\_\_\_.  
 (a) 52 (b) 53 (c) 64 (d) 72
- Q11. If radii of two concentric circles are 4 cm and 5 cm, then the length of each chord of one circle which is tangent to the other circle is \_\_\_\_\_.  
 (a) 3 cm (b) 6 cm (c) 9 cm (d) 1 cm
- Q12. A cylinder and a cone are of same base radius and of same height. Find the ratio of the volume of cylinder to that of the cone.  
 (a) 4:7 (b) 2:5 (c) 3:1 (d) 1:2



13. In the given figure, O is the centre of a circle. The area of sector OAPB is  $\frac{1}{5}$  of the area of the circle. Find x.



- (a)  $45^\circ$  (b)  $90^\circ$  (c)  $60^\circ$  (d)  $72^\circ$

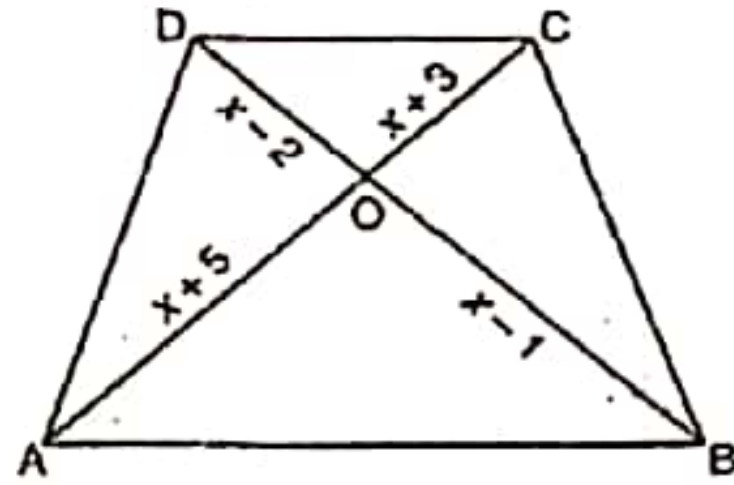
Q14. If  $\tan(3x + 30^\circ) = 1$ , find the value of x

- (a)  $x = 45^\circ$  (b)  $x = 30^\circ$  (c)  $x = 60^\circ$  (d)  $x = 5^\circ$

Q15. Find the mode of the following data: 3, 3, 7, 4, 5, 3, 5, 6, 8, 9, 5, 3, 5, 3, 6, 9, 7, 4

- (a) 3 (b) 7 (c) 5 (d) 6

Q16. In the given figure, if  $AB \parallel DC$ , the value of x is \_\_\_\_\_.



- (a) 5 (b) 7 (c) 6 (d) 4

Q17. Two dice are thrown simultaneously. What is the probability of getting doublet?

- (a)  $\frac{1}{36}$  (b)  $\frac{1}{6}$  (c)  $\frac{5}{6}$  (d)  $\frac{11}{36}$

Q18. What happens to the value of  $\tan \theta$  from  $0^\circ$  to  $90^\circ$ ?

- (a)  $\tan \theta$  increases as  $\theta$  increases (b)  $\tan \theta$  decreases as  $\theta$  increases  
(c)  $\tan \theta$  increases as  $\theta$  decreases (d)  $\tan \theta$  decreases as  $\theta$  decreases

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

Q19. **Assertion:**  $6^n$  cannot end with the digit zero, where n is a natural number.

**Reason:** Any number ends with the digit zero, if its prime factorization includes  $2^m \times 5^n$  where m and n are whole numbers.

- (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.

Q20. **Assertion:** The point (-1, 6) divides the line segment joining the points (-3, 10) and (6, -8) in the ratio 2:7 internally.

**Reason:** Given three points, i.e. A, B, C form an equilateral triangle, then  $AB = BC = AC$ .

- (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.

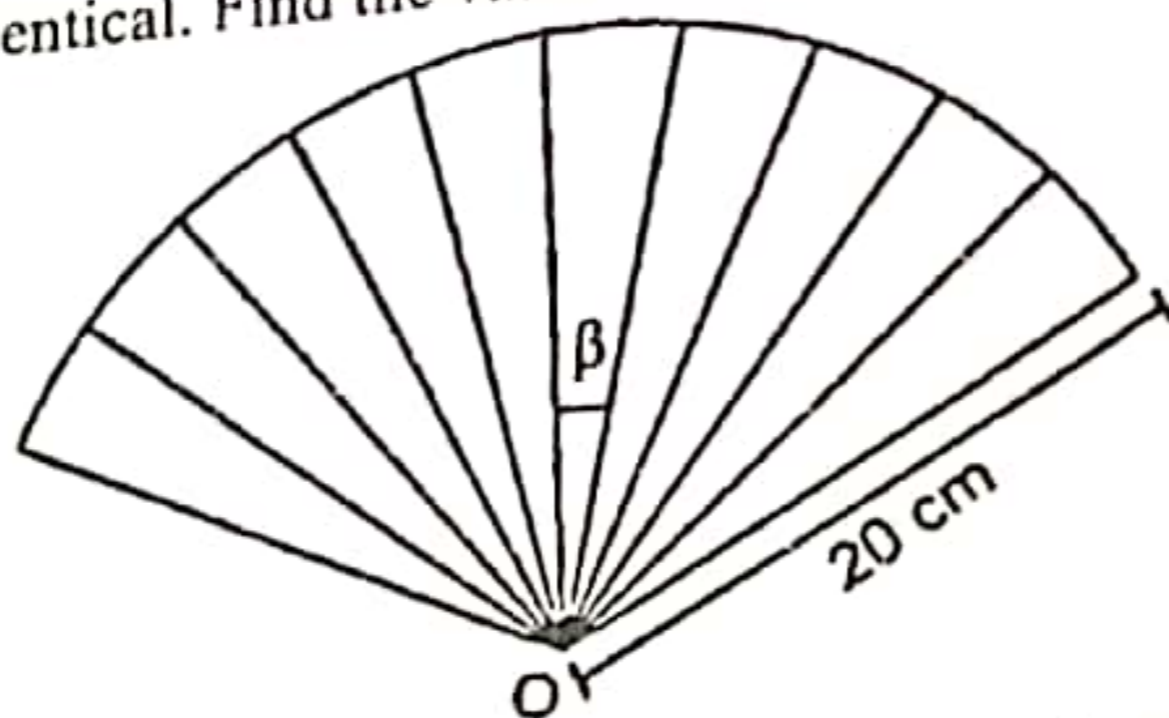


### SECTION B

Section B consists of 5 questions of 2 marks each.

Q21. If  $3^{x+y} = 243$  and  $3^{x-y} = 27$ , find the value of  $x$  and  $y$ .

Q22. The figure below is a part of a circle with centre O. If the area of the given figure is  $\frac{1250\pi}{9} \text{ cm}^2$  and the 10 sectors are identical. Find the value of  $\beta$ , in degrees.

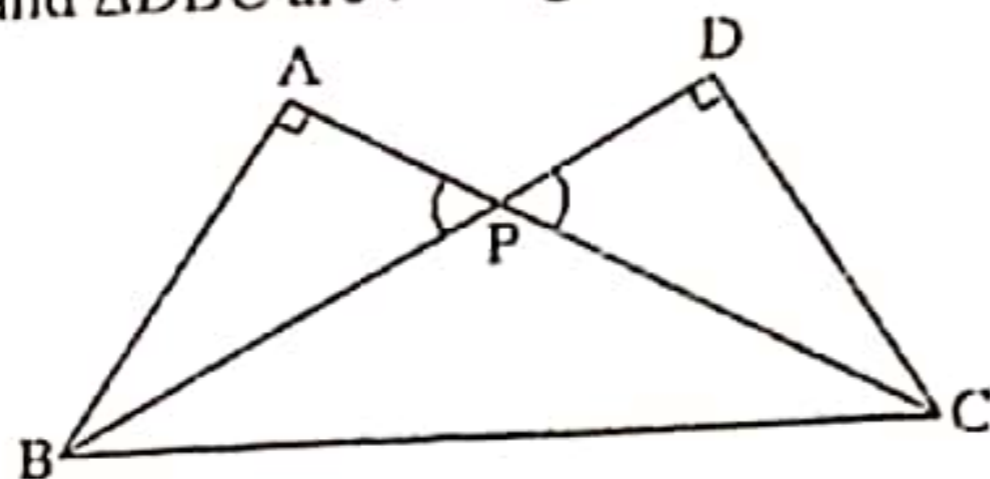


Q23. Prove that the length of the tangents drawn from an external point to a circle are equal.

Q24. X and Y are points on the side AB and AC respectively of a triangle ABC such that  $\frac{AX}{AB} = \frac{1}{4}$ ,  $AY = 2 \text{ cm}$  and  $YC = 6 \text{ cm}$ . Find whether  $XY \parallel BC$  or not.

OR

In the figure,  $\triangle ABC$  and  $\triangle DBC$  are two right triangles. Prove that  $AP \times PC = BP \times PD$ .



Q25. If  $\sin(A+B) = 1$  and  $\cos(A-B) = \frac{\sqrt{3}}{2}$ ,  $0^\circ < A+B \leq 90^\circ$  and  $A > B$ , then find the measures of angles A and B.

OR

Find the acute angle  $\delta$  when  $\frac{\cos \delta - \sin \delta}{\cos \delta + \sin \delta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$ .

### SECTION C

Section C consists of 6 questions of 3 marks each.

Q26. Deepika plays badminton with her friend Shikha in the school badminton court, while playing, the shuttlecock follows a parabolic path.

If the path is depicted by the polynomial  $2x^2 - (1 + 2\sqrt{2})x + \sqrt{2}$ . Then determine its zeroes.

Q27. Prime factorisation of three numbers A, B and C is given below:

$$A = (2^r \times 3^p \times 5^q)$$

$$B = (2^p \times 3^r \times 5^p)$$

$$C = (2^r \times 3^p \times 5^q) \text{ such that, } p < q < r \text{ and } p, q \text{ and } r \text{ are natural numbers.}$$

- The largest number that divides A, B and C without leaving a remainder is 30.

- The smallest number that leaves a remainder of 2 when divided by each of A, B and C is 5402.

Find A, B and C.



Prove the following:

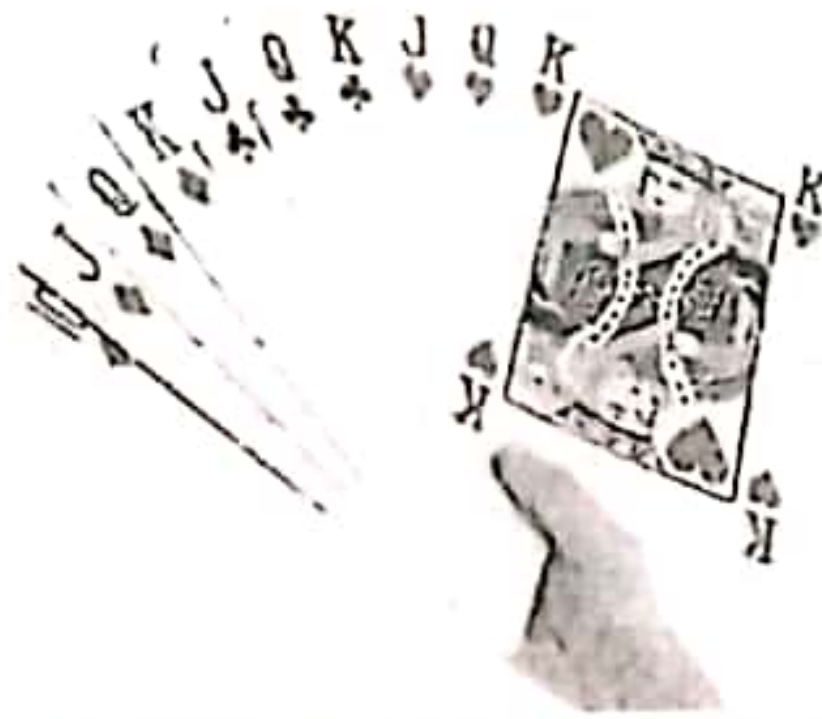
$$\frac{\tan^3 \theta}{1 + \tan^2 \theta} + \frac{\cot^3 \theta}{1 + \cot^2 \theta} = \sec \theta \operatorname{cosec} \theta - 2 \sin \theta \cos \theta$$

Q29. A father has 3 children with a gap of 2 years in every two consecutive children. The sum of present ages of children is half the present age of the father. 4 years ago, the sum of ages of children was 1 year more than the one-fourth of age of the father. Find the present ages of children and the father.

OR

The sum of a two-digit number and the number obtained by reversing the digits is 66. If the digits of the number differ by 2, find the number. How many such numbers are there?

Q30. Shivani took a pack of 52 cards. She kept aside all the black face cards and shuffled the remaining cards well.



Based on the above information, answer the following questions.

- Write the number of total possible outcomes.
- She draws a card from the well-shuffled pack of remaining cards. What is the probability that the card is a face card?
- What is the probability of getting neither a black card nor an ace card?

Q31. The length of the minute hand of a clock is 6 cm. Find the area swept by it when it moves from 7:05 pm to 7:40 pm.

OR

A round table cover has six equal designs as shown in the above right-sided figure. If the radius of the cover is 28 cm, find the cost of making the designs at the rate of ₹0.35 per  $\text{cm}^2$ .



#### SECTION D

Section D consists of 4 questions of 5 marks each.

Q32. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of the same radius. The total height of the toy is 15.5 cm. Find the volume and total surface area of the toy.

OR

A toy is in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of the base of the cone is 21 cm and its volume is  $\frac{2}{3}$  of the volume of the hemisphere, calculate the height of the cone and the surface area of the toy.



Q33. A plane left 30 minutes late than its scheduled time and to reach the destination 1500 km away on time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed.

OR

A shopkeeper buys a number of books for ₹80. If he had bought 4 more books for the same amount, each book would have cost ₹1 less. How many books did he buy?

Q34. Find the mean and mode for the following frequency distribution:

Monthly consumption (in units)	Number of consumers
65-85	4
85-105	5
105-125	13
125-145	20
145-165	14
165-185	8
185-205	4

Q35. (i) State and prove the Basic Proportional Theorem.

(ii) In  $\triangle ABC$ , if DE is parallel to BC,  $\frac{AD}{DB} = \frac{3}{4}$  and AC = 15 cm, then find the length of AE.

### SECTION E

Case study-based questions are compulsory.

Q36 In the quarter of 2021–22, the exports of passenger cars from India increased by 26%, as per a report. A car manufacturing company planned to produce 1800 cars in 4 year and 2600 cars in 8 year. The production increases uniformly by a fixed number every year.



Based on the above information answer the following questions.

(i) Find the production in the 1<sup>st</sup> year. (1)

(ii) Find the production in the 12<sup>th</sup> year. (1)

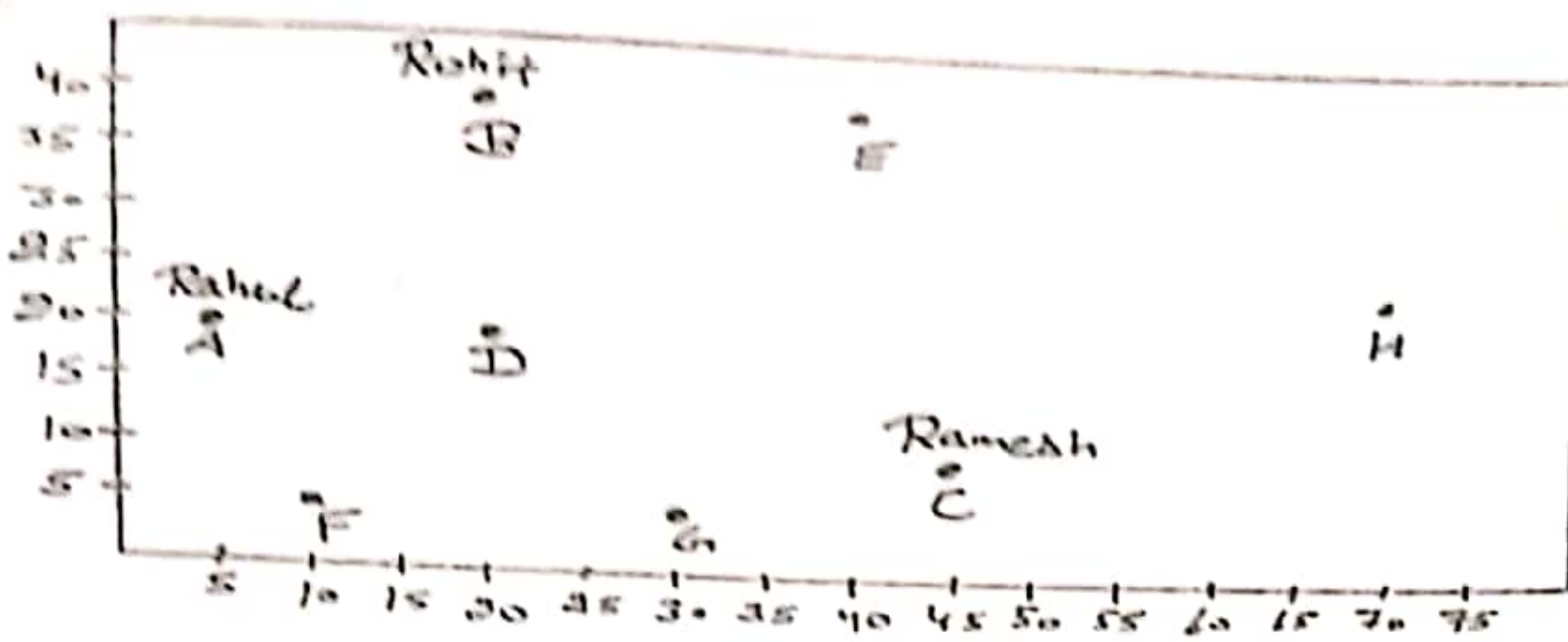
(iii) Find the total production in the first 10 years. (2)

OR

(iii) In how many years will the total production reach 31200 cars? (2)

Q37. Football is the most popular game in the world. It combines strength, speed, and skills. Football is the most watched and most played sport on the earth. In Canada and America, it is called Soccer. Football was invented in China around 476 BC. It is a 90 minutes long game and those 90 minutes are distributed in two 45 minutes halves. Three friends Rohit, Rahul, and Ramesh decide to play Football in a playground of the School. The position of Rohit, Rahul, and Ramesh is shown in the diagram.





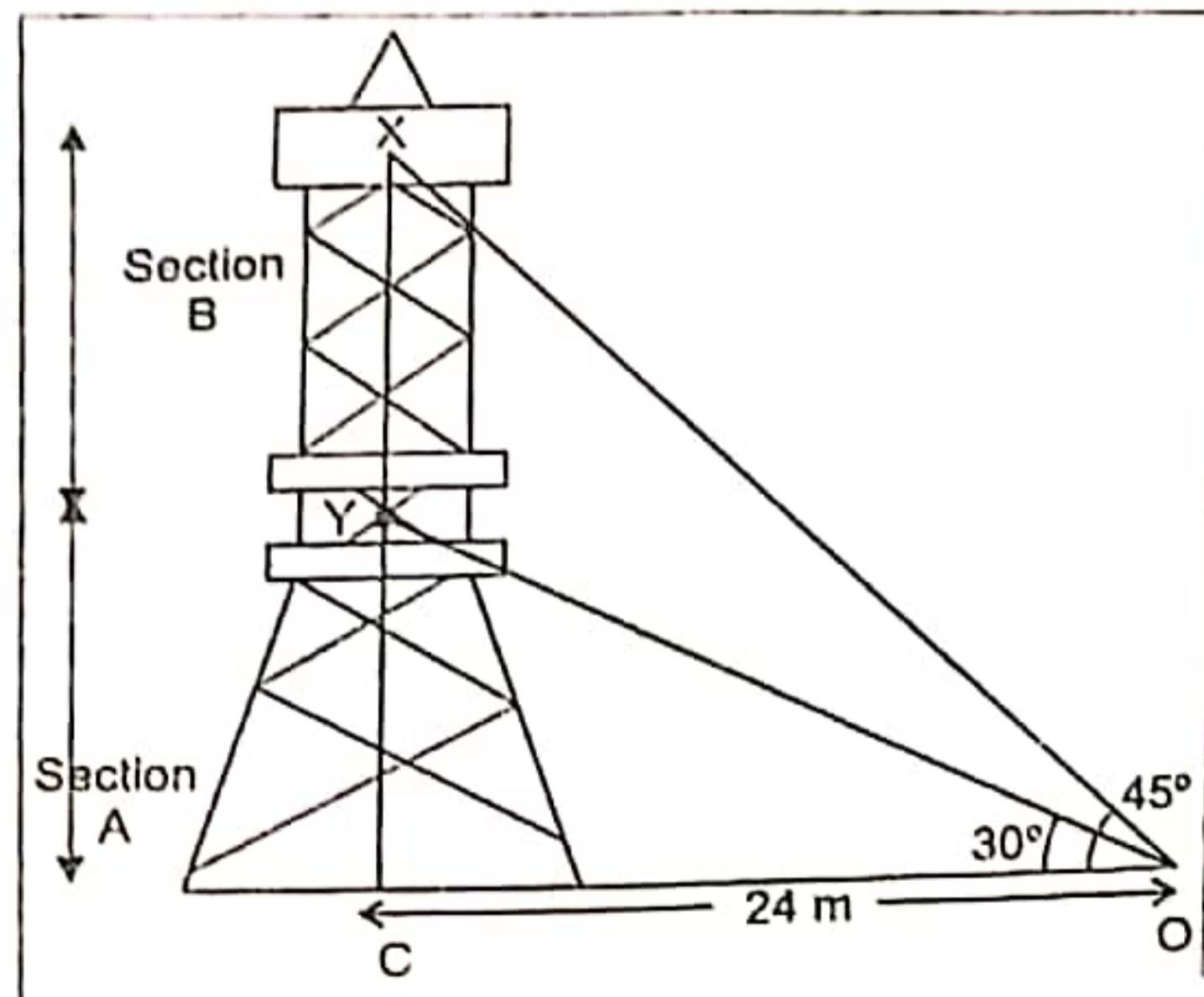
Based on the above information answer the following questions.

- (i) What are the Co-ordinates of Rahul's and Ramesh's position on the field?
- (ii) Find the distance between Rahul and Ramesh.
- (iii) If Rahul takes the football to position E and Rohit comes at position G then find the distance between them.

OR

Find the coordinates of H, G and also find the distance between them.

Q38. Govariya Village in Jharkhand is under development. For the better transmission of signals radio stations were built near village. The tower was built in two section A and B. The engineer involved in the project observed that from a point O which is 24 m from the base of one of the radio stations, the angle of elevation of the top section A is  $30^\circ$  and angle of elevation of top of section B is  $45^\circ$ . ( use  $\sqrt{3} = 1.732$  )



Based on the above information answer the following questions:

- (i) Find the height of the Section A of the tower. (1)
- (ii) Find the total height of the tower. (1)
- (iii) If a wire is tied from the top of radio station (Point X) to a point O on the ground which is 24 m away from the foot of the radio station for the additional support of the radio station, then what is the length of the wire? (2)

OR

One day, a fault occurred in radio station and an engineer climbed upto  $\frac{3}{4}$ th of total height of radio station, then what is the height he climbed up to? (2)