



HANSRAJ PUBLIC SCHOOL
SECTOR-6, PANCHKULA
CLASS-X, PRE-BOARD (2022-23)
SUBJECT- MATHEMATICS

Date- 21-01-2023
Time: 3 hours

Roll No. _____
Maximum Marks: 80

General Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. 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 2 marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION A

- Q.1. If the LCM of a and 18 is 36 and the HCF of a and 18 is 2, then a =
(a) 1 (b) 2 (c) 3 (d) 4
- Q.2. The quadratic equations $x^2 - 4x + k = 0$ has distinct real roots if
(a) $k = 4$ (b) $k > 4$ (c) $k = 16$ (d) $k < 4$
- Q.3. The number of polynomials having zeroes as -2 and 5 is
(a) 1 (b) 2 (c) 3 (d) more than 3
- Q.4. The solution of the following pair of equation is: $x - 3y = 2, 3x - y = 14$
(a) $x = 5, y = 1$ (b) $x = 2, y = 3$ (c) $x = 1, y = 2$ (d) $x = 1, y = 4$
- Q.5. If the distance between the points (4,p) and (1,0) is 5, then value of p is
(a) 4 only (b) ± 4 (c) -4 only (d) 0
- Q.6. In triangle ABC, $DE \parallel AB$, If $CD = 3$ cm, $EC = 4$ cm, $BE = 6$ cm, then DA is equal to
(a) 7.5 cm (b) 3 cm (c) 4.5 cm (d) 6 cm
- Q.7. If $\sin 2A = \frac{1}{2} \tan^2 45^\circ$ where A is an acute angle, then the value of A is
(a) 60° (b) 45° (c) 30° (d) 15°

Q.8. If $x = 2\sin^2 \theta$ and $y = 2\cos^2 \theta + 1$ then $x + y$ is:

- (a) ~~3~~ (b) 2 (c) 1 (d) $1/2$

Q.9. ABCD is a trapezium with $AD \parallel BC$ and $AD = 4\text{cm}$. If the diagonals AC and BD intersect each other at O such that $AO/OC = DO/OB = 1/2$, then BC =

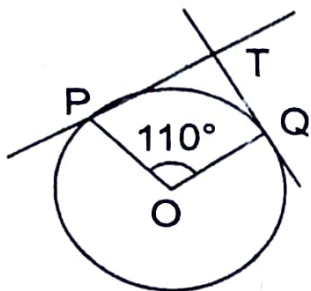
- (a) 6cm (b) 7cm (c) ~~8cm~~ (d) 9cm

Q.10. $\Delta ABC \sim \Delta PQR$. If AM and PN are altitudes of ΔABC and ΔPQR respectively and

$AB^2 : PQ^2 = 4 : 9$, then AM : PN =

- (a) 16 : 81 (b) 4 : 9 (c) 3 : 2 (d) ~~2 : 3~~

Q.11. In the given figure, if TP and TQ are tangents to a circle with centre O, so that $\angle POQ = 110^\circ$, then $\angle PTQ$ is



- (a) 110° (b) 90° (c) 80° (d) ~~70°~~

Q.12. If the area of circle is numerically equal to twice its circumference, then the diameter of the circle is

- (a) 4 units (b) 6 units (c) ~~8 units~~ (d) 12 units

Q.13. The radii of 2 cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3. Then, the ratio of their volumes is:

- (a) 19 : 20 (b) ~~20 : 27~~ (c) 18 : 25 (d) 17 : 23

Q.14. The median class of the following data is:

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
No. of students	8	10	12	22	30	18
		18	30	52	82	100

- (a) 20 - 30 (b) 30 - 40 (c) ~~40 - 50~~ (d) 50 - 60

Q.15. The area of the square that can be inscribed in a circle of radius 8 cm is

- (a) 256 cm^2 (b) ~~128 cm^2~~ (c) $64\sqrt{2}\text{ cm}^2$ (d) 64 cm^2

Q.16. Consider the data: For the following distribution:

Class	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25
No. of students	10	11	12	20	9

the sum of lower limits of the median class and modal class is

- (a) 15 (b) 25 (c) 30 (d) 35

Q.17. Two dice are thrown simultaneously. What is the probability of getting doublet?

- (a) $1/36$ (b) $1/6$ (c) $5/6$ (d) $11/36$

Q.18. If $\sin A = 1/2$, $\cos B = 1$, $0 < A, B \leq \pi/2$, then the value of $\cot(A + B)$ is:

- (a) $\sqrt{3}/2$ (b) $1/2$ (c) 0 (d) $\sqrt{3}$

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

Assertion (A): The number 6^n , n being a natural number, ends with the digit 5.

Reason (R): The number 9^n cannot end with digit 0 for any natural number n.

- (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.

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

Statement A (Assertion): The value of y is 3, if the distance between the points P(2, -3) and Q(10, y) is 10.

Statement R(Reason): Distance between two points is given by $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

- ~~(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.

Q.21. For what value of k for which the following pair of linear equations have infinitely many solutions: $2x + 3y = 7$; $(k - 1)x + (k + 2)y = 3k$.

Q.22. ABCD is a trapezium in which $AB \parallel CD$ and its diagonals intersect each other at the point O. Using a similarity criterion of two triangles, show that $\frac{OA}{OC} = \frac{OB}{OD}$

Q.23. XY and MN are the tangents drawn at the end points of the diameter DE of the circle with centre O. Prove that $XY \parallel MN$.

Q.24. The perimeter of a sector of a circle of radius 5.2 cm is 16.4 cm. Find the area of the sector.

OR

If the perimeter of a semi-circular protractor is 108 cm, find the diameter of the protractor.

Q.25. Evaluate: $3 \cos^2 60^\circ \sec^2 30^\circ - 2 \sin^2 30^\circ \tan^2 60^\circ$

OR

If $(1 + \cos A)(1 - \cos A) = 3/4$, find the value of $\tan A$.

SECTION C

Section C consists of 6 questions of 3 marks each.

Q.26. Given that $\sqrt{5}$ is irrational, prove that $5 + 2\sqrt{5}$ is irrational.

Q.27. Find the zeroes of the quadratic polynomial $6x^2 - 7x - 3$ and verify the relationship between the zeroes and the coefficients of the polynomial.

Q.28. The sum of the digits of a two-digit number is 9. Also 9 times this number is twice the number obtained by reversing the order of the digits. Find the number.

OR

A father's age is three times the sum of the ages of his children. After 5 years, his age will be two times the sum of their ages. Find the present age of the father.

Q.29. Prove that: $\sin \theta (1 + \tan \theta) + \cos \theta (1 + \cot \theta) = \sec \theta + \operatorname{cosec} \theta$.

Q.30. Prove that a parallelogram circumscribing a circle is a rhombus

OR

Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

Q.31. From a pack of 52 playing cards, jacks, queens, kings and aces of red colour are removed. From the remaining a card is drawn at random. Find the probability that the card drawn is

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

SECTION D

Section D consists of 4 questions of 5 marks each.

Q.32. If Zeba was younger by 5 years than what she really is, then the square of her age (in years) would have been 11 more than five times her actual age. What is her age now?

OR

Rs.6500 were divided equally among a certain number of persons. Had there been 15 more persons, each would have got Rs.30 less. Find the original number of persons.

Q.33. State and Prove Basic Proportionality Theorem.

Q.34. A vessel is in the form of an inverted cone. Its height is 8 cm and the radius of its top which is open, is 5 cm. It is filled with water upto the brim. When lead shots, each of which is a sphere of radius 0.5 cm are dropped into the vessel, one-fourth of water flows out. Find the number of lead shots dropped into the vessel.

OR

A cubical block of side 10 cm is surmounted by a hemisphere. What is the largest diameter that the hemisphere can have? Find the cost of painting the total surface area of the solid so formed, at the rate of Rs. 5 per 100 sq. cm. [Use $\pi = 3.14$]

33.175 , 6.635

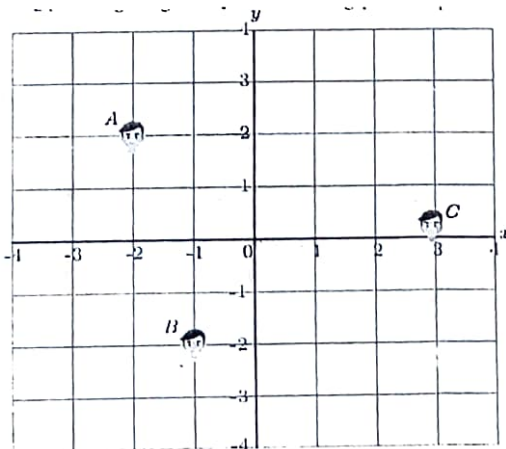
Q.35. The median of the following data is 868. Find the values of x and y, if the total frequency is 100

Class	800 – 820	820 – 840	840 – 860	860 – 880	880 – 900	900 – 920	920 – 940
Frequency	7	14	x	25	y	10	5

SECTION E

Case study-based questions are compulsory.

Q.36. Aamish, Rahul and Dilip are fast friend since childhood. They always want to sit in a row in the classroom. But teacher doesn't allow them and rotate the seats row-wise everyday. Rahul is very good in maths and he does distance calculation everyday. He considers the centre of class as origin and marks their position on a paper in a co-ordinate system. One day Rahul makes the following diagram of their seating position marked Aamish as A, Rahul as B and Dilip as C.



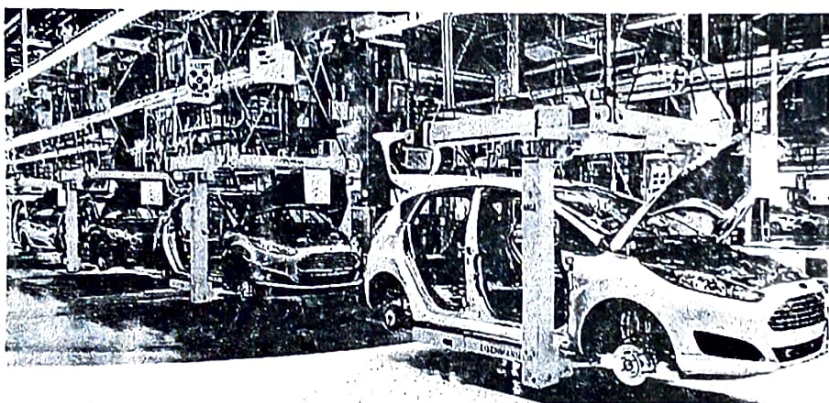
Use the above figure to answer the questions that follow:

- (i) What is the distance between A and B? [1]
- (ii) What is the distance between B and C? [1]
- (iii) A point D lies on the line segment between points A and B such that $AD:DB = 4:3$. What are the coordinates of point D? [2]

OR

- (iii) If the point P (k, 0) divides the line segment joining the points A (2, -2) and B (-7, 4) in the ratio 1:2, then find the value of k. [2]

Q.37. In the month of April to June 2022, the exports of passenger cars from India increased by 26% in the corresponding quarter of 2021-22, as per a report. A car manufacturing company planned to produce 1800 cars in 4th year and 2600 cars in 8th year. Assuming that the production increases uniformly by a fixed number every year.



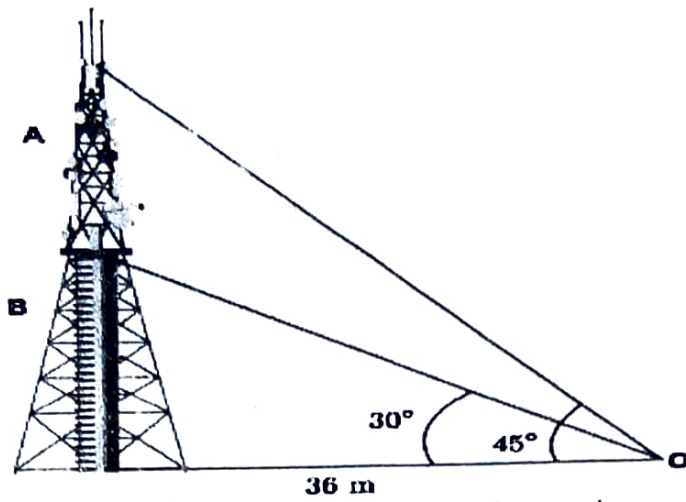
Based on the above information answer the following questions.

- (i) Find the production in the 1st year. (1)
- (ii) Find the production in the 12th year. (1)
- (iii) Find the total production in first 10 years. (2)

OR

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

Q.38. Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure, including microwave dishes. They are among the tallest human-made structures. There are 2 main types: guyed and self-supporting structures. On a similar concept, a radio station tower was built in two sections A and B. Tower is supported by wires from a point O. Distance between the base of the tower and point O is 36 m. From point O, the angle of elevation of the top of section B is 30° and the angle of elevation of the top of section A is 45° .



Based on the above information answer the following questions.

(i) What is the height of the section B? (1)

(ii) What is the height of the section A? (1)

(iii) What is the length of the wire structure from the point O to the top of section A? (2)

OR

What is the length of the wire structure from the point O to the top of section B? (2)