Param Jaitly
X - D

PRE-BOARD EXAMINATION (2024-25)
CLASS X – MATHEMATICS (STANDARD) (041)

Max Marks: 80 Time: 3Hours

General Instructions:

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Q1-Q18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Q21-Q25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Q26-Q31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Q32-Q35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Q36-Q38 are case study-based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Questions of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required. Take $\pi = 22/7$ wherever required if not stated otherwise.

SECTION A

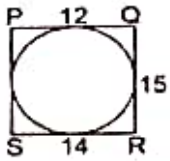
Q1 If the HCF of 26 and 91 is expressible in the form 26a – 91, then the value of a is
(a) 4 (b) 2 (c) 1 (d) 3

Q2 The value of k for which the quadratic equation $x^2+k(4x+k-1)+2=0$ has equal roots is
(a) 2/3 (b) -1 (c) both (a) and (b) (d) none of these

Q3 If ΔABC is right angled at C then the value of cos (A +B)
(a) 0 (b) 1 (c) ½ (d) √3/2

Q4 If two tangents inclined at an angle of 60° are drawn to a circle of radius 3cm, then the length of each tangent is
(a) 3√3/2 cm (b) 6 cm (c) 3 cm (d) 3√3 cm

Q5 A quadrilateral PQRS is drawn to circumscribe a circle. If PQ=12cm, QR=15cm and RS=14cm, then find the length of SP
(a) 15 cm (b) 14 cm (b) 12 cm (d) 11 cm



Q6 The probability of getting a bad egg in a lot of 400 is 0.035. The number of bad eggs in the lot is
(a) 7 (b) 14 (c) 21 (d) 28

Q7 In ΔABC right angled at B, AB=7cm and AC–BC=1cm, then the value of (1-CosC)/SinC is
(a)4 (b) 5 (c) 1/7 (d) 1/4

Q8 The 4^{th} term from the end of the AP -11, -8, -5, ..., 49 is
(a) 37 (b) 40 (c) 43 (d) 58

Q9 The upper limit of the modal class of the given distribution is

Height [in cm]	Below 140	Below 145	Below 150	Below 155	Below 160	Below 165
Number of girls	4	11	29	40	46	51

(a) 165 (b) 150 (c)155 (d) 150

Q10 If $\Delta ABC \sim \Delta PQR$, AB:PQ=2:3, AD and PS are perpendicular to BC and QR respectively, AD=x, PS=x+5, then the value of x is
(a) 10 (b) 7 (c) 5 (d) 3

Q11 The zeroes of the quadratic polynomial $x^2 + kx + k$, $k \neq 0$
(a) Cannot both be positive (b) cannot both be negative
(c) are always unequal (d) both (a) and (c)

Q12 A solid cone of radius r and height h is placed over a solid cylinder having same base radius and height as that of cone. The total surface area of combined solid is
(a) $\pi r [l + 3r + 2h]$ (b) $\pi r [l + 3r + 2h]$
(c) $\pi r [l + 2r + h]$ (d) $\pi r [l + r + 2h]$

Q13 A pole 6m high casts a shadow $2\sqrt{3}$m long on the ground, then the Sun's elevation is
(a) 60° (b) 45° (c) 30° (d) 90°

Q14 Area of the largest triangle that can be inscribed in a semi-circle of radius r is
(a) $2r^2$ sq.units (b) r^2 sq.units (c) $(1/2)r^2$ sq.units (d) $\sqrt{2}r^2$ sq.units

Q15 If the point P (2, 1) lies on the segment joining points A (4, 2) and B (8, 4) then
(a) AP = (1/3)AB (b) AP = AB (c) PB = (1/3)AB (d) AP = (1/2)AB

Q16 A bag contains 3 red, 5 black and 4 blue balls. A ball is drawn at random from a bag. What is the probability that the ball drawn is not red
(a) 3 / 4 (b) 1 / 4 (c) 1 / 3 (d) 4 / 3

Q17 One equation of a pair of dependent linear equation is –5x+7y=2. The second equation can be
(a) 10x +14y + 4 = 0 (b) – 10x – 14y + 4 = 0
(c) - 10x + 14y + 4 = 0 (d) 10x – 14y = - 4

Q18 The 4th vertex of rectangle whose three vertices are (4 ,1), (7, 4) and (13, -2) is
(a) (-10, 5) (b) (-3,8) (c) (10, -5) (d) (4, -4)

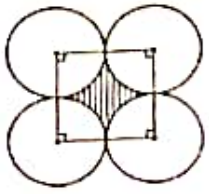
DIRECTION: In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option
A - Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
B - Both assertion (A) and reason (R) are true and reason (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.

Q19 Statement A (Assertion): -5, -5/2, 0, 5/2 ..... is in Arithmetic progression.
Statement R (Reason): The terms of an Arithmetic Progression cannot have both positive and negative rational numbers

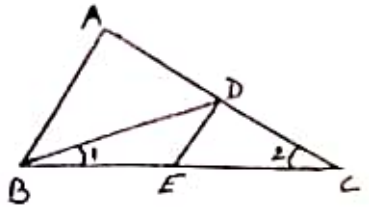
Q20 Statement A (Assertion): The curved surface area of cone having height 24cm and radius 7 cm is $550cm^2$.
Statement R (Reason): Curved surface area of cone with radius r and height h is πrl where $l = \sqrt{r^2 + h^2}$

SECTION B

Q21 Find the area of the shaded region if length of radius of each circle is 7cm.Each circle touches the other two externally.

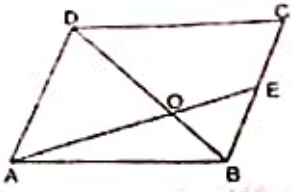


Q22 In given figure ∠1=∠2 and AC/BD = CB/CE. Prove that ΔACB~ΔDCE



OR

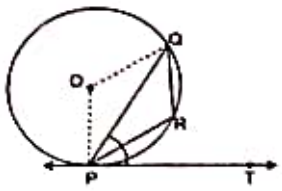
In the given figure ABCD is a parallelogram. AE divides the line segment BD in the ratio 1:3. If BE=1.5cm, find BC



Q23 If $\sqrt{3}\sin\theta = \cos\theta$, then find the value of $\frac{3\cos^2\theta + 2\cos\theta}{3\cos\theta + 2}$

Q24 Show that 12^n cannot end with digit 0 or 5 for any natural number n.

Q25 In the figure, PQ is a chord of a circle with centre O and PT is a tangent. If ∠QPT = 60°, find measure of ∠PRQ.



OR

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

SECTION C

Q26 Prove that $\sqrt{2} + \sqrt{3}$ is irrational

Q27 Prove that $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$

Q28 If α and β are the zeros of the quadratic polynomial $f(x) = x^2 - 4x + 3$, find the value of $\alpha^4\beta^2 + \alpha^2\beta^4$.

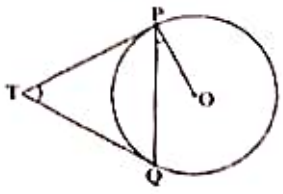
Q29 Solve the following system of linear equations:

$$\frac{x}{a} + \frac{y}{b} = 2$$
$$ax - by = a^2 - b^2$$

OR

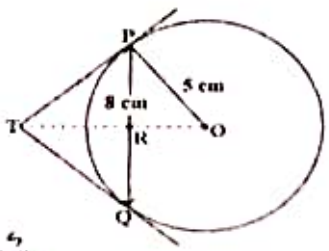
The sum of the numerator and denominator of a fraction is 8. If 3 is added to both the numerator and the denominator the fraction become 3 / 4. Find the fraction.

Q30 Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that ∠PTQ = 2 ∠OPQ.



OR

PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length TP.



Q31 The marks obtained by 110 students in an examination are given below. Calculate the mode of given data.

Marks	30-35	35-40	40-45	45-50	50-55	55-60	60-65
Number of students	14	16	28	23	18	8	3

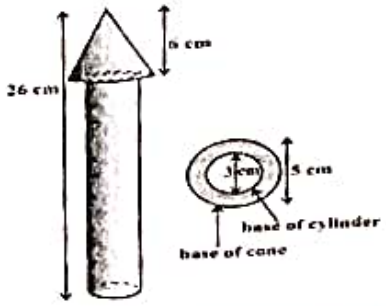
SECTION D

Q32 If the roots of the equation $(x-a)(x-b)+(x-b)(x-c)+(x-c)(x-a)=0$ are equal. Then show that $a = b = c$.

OR

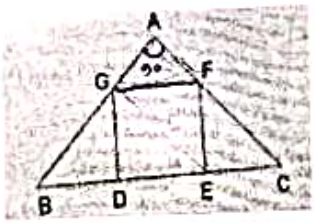
A fast train takes 1 hour less than a slow train for a journey of 200 km. If the speed of the slow train is 10 km/h less than that of the fast train, find the speed of each train.

Q33 A wooden toy rocket is in the shape of a cone mounted on a cylinder, as shown in Figure. The height of the entire rocket is 26cm, while the height of the conical part is 6cm. The base of the conical portion has a diameter of 5cm, while the base diameter of the cylindrical portion is 3cm. If the conical portion is to be painted orange and the cylindrical portion yellow, find the area of the rocket painted with each of these colours. (Take $\pi = 3.14$).



Q34 In given figure DEFG is a square and $\angle BAC = 90°$. Prove that

(i) $\Delta AGF \sim \Delta DBG$
(ii) $\Delta AGF \sim \Delta EFC$
(iii) $\Delta DBG \sim \Delta EFC$
(iv) $DE^2 = BD \times EC$



Q35 On annual day of a school, 400 students participated in the function. Frequency distribution showing their ages is as shown in the following table:

Ages (in years)	05-07	07-09	09-11	11-13	13-15	15-17	17-19
Number of students	70	120	32	100	45	28	5

Find mean and median of the above data.

OR

Find missing frequencies in the following frequency distribution table, if total number of students is 100 and median is 32

Marks	0-10	10-20	20-30	30-40	40-50	50-60	Total
Number of students	10	X	25	30	Y	10	100

SECTION E

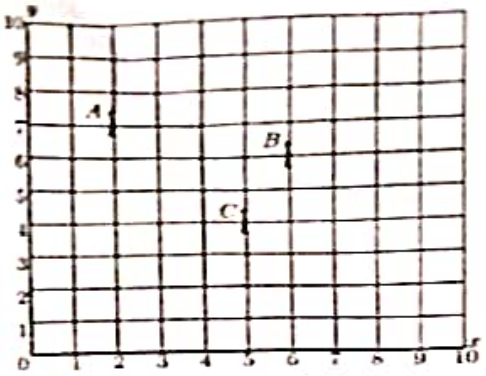
Q36 Your friend wants to buy a car and plans to take a loan from bank for his car. He pays back his total loan of ₹1,18,000. He pays every month starting with the first instalment of ₹1,000 and he increases the instalment by ₹ 100 every month. Based on above information, answer the following question:

i) Find the amount paid by him in 30th instalment.
ii) Find the amount paid by him in 30 instalments.
iii) Find the total number of instalments paid to repay his loan amount.

OR

Find the ratio of 1st and last instalment.

Q37 Resident Welfare Association (RWA) of a Gulmohar Society in Delhi have installed three electric poles A, B and C in a society's common park. The poles A, B, C lie on the intersection of vertical and horizontal lines. Despite these three poles, some parts of the park are still in dark. So, RWA decides to have one more electric pole D in the park. The park can be modelled as a coordinate systems given below.



On the basis of the above information, answer the following questions:

(i) What is the position of the pole C?

(ii) What is the distance of the pole B from the corner O of the park?

(iii) Find the position of the fourth pole D so that four points A, B, C and D form a parallelogram.

OR

What is the distance between poles A and C?

Q38 When an eagle looks at a rat on the ground, eagle does not attack the rat at its initial position. It takes into account the speed of the rat and the direction in which rat is moving. After analysing the situation (it may be God's gift) eagle attacks the rat in such a way that it is successful in catching the rat. Suppose an eagle sitting on the tree of height 90 m, observe a rat with angle of depression 45°, and moving away from the tree with some speed. After some time, eagle observes rat (static) with angle of depression 30° and catch it in 10 second.

(i) Draw a neat and labelled diagram to represent above situation.

(ii) What is the horizontal distance between tree and initial position of rat?

(iii) What is the distance travelled by eagle to catch rat?

OR

What is the distance travelled by rat in 10 seconds?