The Best CBSE School of India.

PRINCE ACADEMY

Series PHMS **Question Paper Code PAHE/2**

ROLL NO. | | | | | | | | |

Candidate must write the Q.P. Code on the title page of the answer-book.

- Please check that this question paper contains 8 printed pages.
- Please check that this question paper contains 38 questions.
- Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please write down the Series Number of the question in the answer-book before attempting it.
- 15-minute time has been allotted to read this question paper. The students will read the question paper only and will not write any answer on the answer-book during this period.

MATHEMATICS STANDARD (041)

Time allowed : 3 hours *Maximum Marks:80*

General Instructions:

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions. All Questions are compulsory.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Question numbers 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Question numbers 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Question numbers 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Question numbers 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Question numbers 36-38 are case study-based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
8. Draw neat and clean figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.
09. Use of calculators is not allowed.

SECTION-A

This section has 20 Multiple Choice Question (MCQs) carrying 1 mark each.

01. The ratio of HCF to LCM of least composite number and least prime number is

(a) 1 : 2 (b) 2 : 1

(c) 1 : 1 (d) 1 : 3

02. The coordinates of the point which is reflection of point (-3, 5) in *x*-axis are

(a) (3, 5) (b) (3, -5)

(c) (-3, -5) (d) (-3, 5)

03. The pair of equations $ax + 2y = 9$ and $3x + by = 18$ represent parallel lines, where 'a' and 'b' are integers if

(a) a = b (b) $3a = 2b$

(c) $2a = 3b$ (d) $ab = 6$

04. The roots of the quadratic equation $x^2 - 0.04 = 0$ are

(a) ± 0.2 (b) ± 0.02

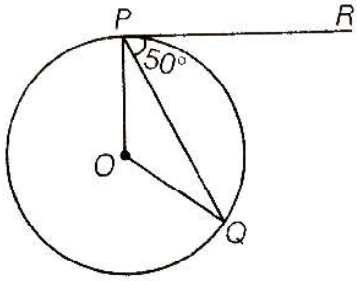
(c) 0.4 (d) 2

05. Given that $\sec\theta = \sqrt{2}$ than the value of $\frac{1+\tan\theta}{\sin\theta}$ is

(a) $2\sqrt{2}$ (b) $\sqrt{2}$

(c) $3\sqrt{2}$ (d) 2

06. In the given figure, O is the centre of the circle and PQ is the chord. If tangent PR at P makes an angle of 50° with PQ, then the measure of $\angle POQ$ is



(a) 50° (b) 40°

(c) 100° (d) 130°

07. What is the area of semicircle of diameter 'd'?

(a) $\frac{1}{16}\pi d^2$ (b) $\frac{1}{4}\pi d^2$

(c) $\frac{1}{8}\pi d^2$ (d) $\frac{1}{2}\pi d^2$

08. If $2\sin 5x = \sqrt{3},\ 0° \le x \le 90°,$ then x is equal to -

(a) 10°
(b) 12°
(c) 20°
(d) 50°

09. Two coins are tossed together. The probability of getting atleast one tail is -

(a) $\frac{1}{4}$
(b) $\frac{1}{2}$
(c) $\frac{3}{4}$
(d) 1

10. The sum of two numbers is 1215 and their HCF is 81. Then the possible pairs of such numbers are -

(a) 2
(b) 3
(c) 4
(d) 5

11. If the area of base of right circular cone is $51cm^2$ and its volume is $85cm^3$, then height of the cone is -

(a) $\frac{5}{6}cm$
(b) $\frac{5}{2}cm$
(c) $\frac{5}{3}cm$
(d) $5cm$

12. The number of revolutions made by circular wheel of radius 0.25m is rolling a distance of 11km is -

(a) 2800
(b) 4000
(c) 5500
(d) 7000

13. A dice is rolled twice. The probability that 5 will not come up either time is -

(a) $\frac{11}{36}$
(b) $\frac{1}{3}$
(c) $\frac{13}{36}$
(d) $\frac{25}{36}$

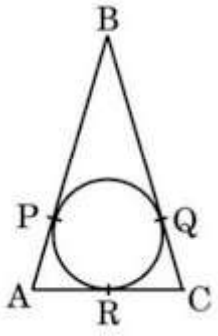
14. If the difference of mode and median of the data is 24 then the difference of the median and mean is -

(a) 8
(b) 12
(c) 24
(d) 36

15. The line segment joining the points P(-3, 2) and Q(5, 7) is divided by y-axis in ratio -

(a) 3 : 1
(b) 3 : 4
(c) 3 : 2
(d) 3 : 5

16. In the given figure AB = BC = 10cm. If AC = 7cm then length of BP is -



(a) 3.5cm (b) 7cm
(c) 6.5cm (d) 5cm

17. If in triangles ΔAOD and ΔBOC, $\frac{AO}{BC} = \frac{AD}{BO} = \frac{OD}{OC}$, then -

(a) $\Delta AOD \sim \Delta BOC$ (b) $\Delta AOD \sim \Delta BCO$
(c) $\Delta ADO \sim \Delta BCO$ (d) $\Delta ODA \sim \Delta OBC$

18. If one root of $ax^2 + bx + c = 0$ is three times the other, then $b^2 : AC$ is -
(a) 3 : 1 (b) 3 : 16
(c) 16 : 3 (d) 16 : 1

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.

19. **Assertion (A) :** The number 3^n cannot be divisible by 2, for any natural number n.
Reason (R) : The number is divisible by 2 if it has 2 as a factor in prime factorisation.

20. **Assertion (A) :** If $\tan A + \cot A = 2$, then $\sin A + \cos A = \sqrt{2}$.
Reason (R) : $\tan A + \cot A = 2$ implies $A = 45°$.

SECTION - B

This section has 5 Very Short Answer (VSA) type questions carrying 2 marks each

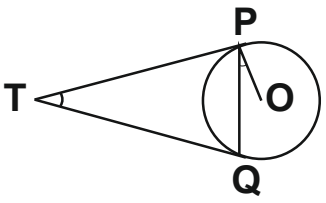
21. (i) Which term of the A.P.: 65, 61, 57, 53, ... is the first negative term?

OR

(ii) Find the middle term of the A.P. 7, 13, 19, ... 247.

22. If $\tan A = \frac{3}{4}$, find the value of $\frac{2\sin A \times \cos A}{\sin^2 A - \cos^2 A}$.

23. From an external point T, two tangents TP and TQ are drawn to a circle with centre O. Prove that $\angle PTQ = 2\angle OPQ$.



24. (i) The curved surface area of a cone is 308cm^2 and its slant height is 14cm. Find its radius and total surface area.

$\left(Use \pi = \frac{22}{7}\right)$

OR

(ii) The volume of a right circular cone is 1232cm^3 and height is 24cm. Find the radius.

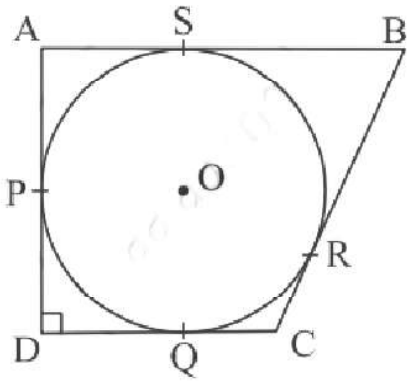
$\left(Use \pi = \frac{22}{7}\right)$

25. Prove that the tangents drawn at the ends of a diameter of a circle are parallel to each other.

SECTION - C

This section has 6 Short Answer (SA) type questions carrying 3 marks each.

26. A circle with centre O and radius 8cm is inscribed in a quadrilateral ABCD in which P, Q, R, S are the points of contact as shown. If AD is perpendicular to DC, BC = 30cm and BS = 24cm, then find the length DC.



27. Prove that $\sqrt{5}$ is an irrational number.

28. If α and β are the zeroes of the polynomial $x^2 + 2x - 4$, then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$.

29. (i) If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$.

OR

(ii) Prove that $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \cos ecA + \cot A$.

30. While dealing a standard pack of 52 cards during a game, one card slipped and fell face down on the floor. Find the probability that the fallen card:

(i) is not a numbered card

(ii) is a red ace

(iii) a king of red colour

31. (i) The monthly income to Aryan and Babban are in the ratio 3 : 4 and their monthly expenditures are in ratio 5 : 7. If each saves Rs.15,000 per month, find their monthly incomes.

OR

(ii) Solve the following system of equations graphically:

$2x + y = 6, 2x - y - 2 = 0.$ Find teh area of the triangle so formed by two lines and $x - axis$.

SECTION - D

This section has 4 Long Answer (LA) type questions carrying 5 marks each.

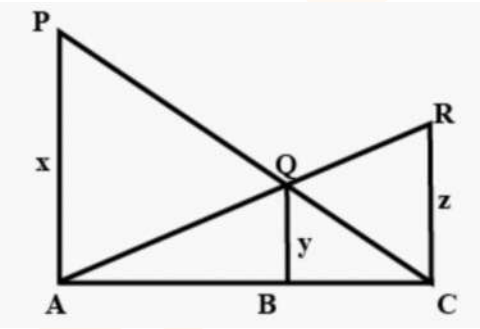
32. (i) Two water taps together can fill a tank in 9 hours 36 minutes. The tap with the larger diameter takes 8 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

OR

(ii) An express train takes 1 hour less than a passenger train to travel 132km between Mysore and Bangalore (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11km/h more than that of the passenger train, find the average speed of the two train.

33. (i) In the below given figure PA, QB and RC are each perpendicular to AC. If $AP = x, BQ = y$ and $CR = z$, then prove that:

$$\frac{1}{x} + \frac{1}{z} = \frac{1}{y}$$



OR

(ii) Sides AB and BC, and median AD to ΔABC are proportional to sides PQ and QR and median PM, respectively, of another triangle PQR. Show that $\Delta ABC \sim \Delta PQR$.

34. A solid comprising a right circular cone of height 120cm and radius 60cm standing on a hemisphere of radius 60cm is placed upright in a right circular cylinder full of water such that it touches the bottom. Find the volume of water left in the cylinder if the cylinder is 60cm and its height is 180cm filled with water upto brim

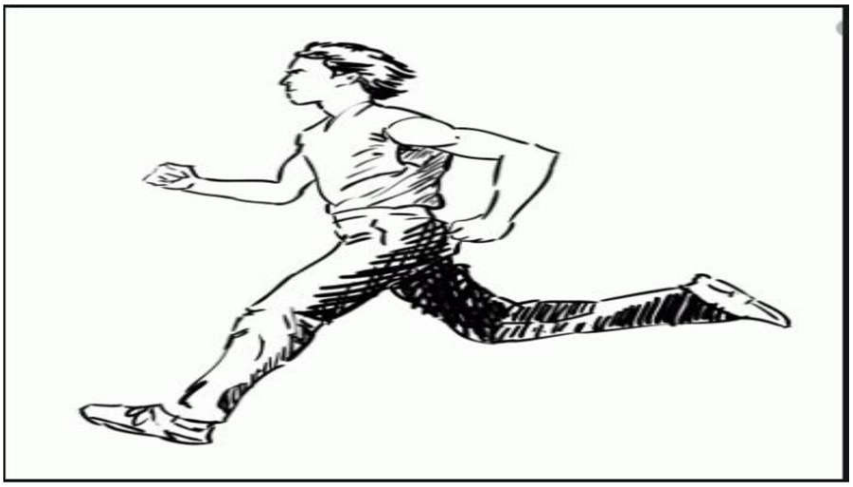
35. A student note the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarized it in the table given below. Find the mode and median of the following data.

Number of cars	**0-10**	**10-20**	**20-30**	**30-40**	**40-50**	**50-60**	**60-70**	**70-80**
Frequency (periods)	7	14	13	12	20	11	15	8

SECTION - E

This section has 3 case study based questions carrying 4 marks each.

36. Your friend Veer wants to participate in a 200m running race. He can currently run that distance in 51 seconds and with each day of practice it takes him 2 seconds less. he wants to reduce the time to 31 seconds.



(i) Form an A.P. depicting the situation.

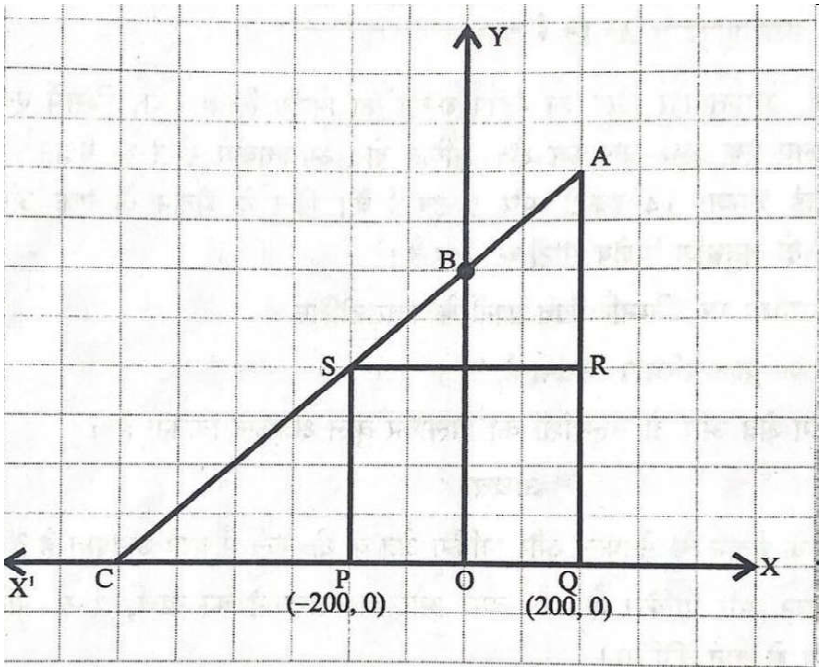
(ii) What is the minimum number of days he must practice to achieve his goal?

(iii) (a) If the n^{th} term of an A.P. is given by $a_n = 2n + 3$, find the common difference of A.P.

OR

(b) If Veer continues practicing even after reaching his goal and imprives for 5 more days, how much time will he take to complete 200m on the 5^{th} day after reaching his goal?

37. Jagdish has a field which is in the shape of a right-angled triangle AQC. He wants to leave a space in the form of a square PQRS inside the field for growing wheat and the remaining for growing vegetables, as shown in the figure. In the field, there is a pole marked as O.



Based on the above information, answer the following questions:

(i) Taking O as origin, coordinates of P are (-200, 0) and of Q are (200, 0). PQRS being a square, what are the coordinates of R and S?

(ii) (a) What is the area of square PQRS?

OR

(b) What is the length of diagonal PR in square PQRS?

(iii) If S divides CA in the ratio K : 1, what is the value of K, where point A is (200, 800)?

38. India gate (formerly known as All India wr memorial) is located near Karthavya path (formerly Rajpath) at New Delhi. It stands as a memorial to 74,187 soldiers of Indian Army, who gave their lives in the first world war. This 42m tall structure was designed by Sir Edwin Lutyens in the style of Roman triumphal arches. A student Shreya of height 1m visited India Gate as a part of her study tour.

Using this information, answer the following questions:

(i) What is the angle of elevation from Shreya's eye to the top of the India Gate, if she is standing at a distance of 41m away from the India Gate?

(ii) If Shreya observes the angle of elevation from her eye to the top fo the India Gate to be 60°, then how far is the she standing from the base of the India Gate?

(iii) (a) If the angle of elevation from Shreya's eye changes from 45° to 30°, when she moves some distance back from the original position, find the distance she moves back.

OR

(b) If Shreya moves to a point which is at a distance of $41\sqrt{3}$ m from the India Gate, then find the angle of elevation made by her eye to the top of the India Gate.

* * * * *