Delhi Public School, Howrah

PERIODIC ASSESSMENT-II (2024-2025)

Class-X

Care must be taken not to write anything on the question paper. All the questions must be attempted in the correct sequence.

Mathematics (Code No-041)

Time: 3 Hours **F.M. 80**

General Instructions:

This Question Paper has 5 Sections A, B, C, D and 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 subparts of the values of 1, 1 and 2 marks each respectively.

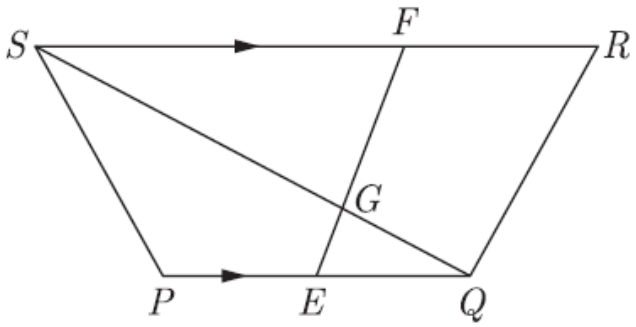
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Qs of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.

8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

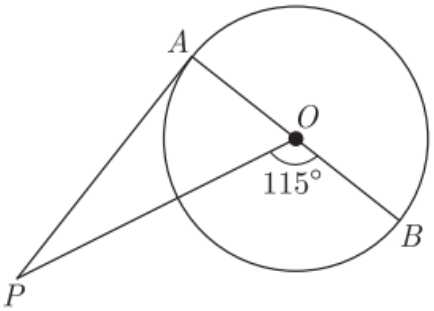
Section A

Section A consists of 20 questions of 1 mark each.

1. If $a = 2^3 \times 3, b = 2 \times 3 \times 5, c = 3^n \times 5$ *and* $LCM(a, b, c) = 2^3 \times 3^2 \times 5$, then n is equal to
   (a) 1 (b) 2 (c) 3 (d) 4
2. For what value of k, 2x+3y=4, (k+2) x+6y=3k+2 will have infinitely many solutions?
   a) 1 b) 4 c) 5 d) 2
3. In the figure, PQRS is a trapezium in which PQ||RS. On PQ and RS, there are points E and F respectively such that EF intersects SQ at G. Then EQ × GS is equal to



   (a) $GQ \times FS$ (b) $2GQ \times FS$ (c) $3GQ \times FS$ (d) $4GQ \times FS$
4. In the given figure, PA is a tangent from an external point P to a circle with centre O. If $\angle POB = 115°$, then the measure of the angle $\angle APO$ is



   (a) $25°$ (b) $20°$ (c) $30°$ (d) $65°$

5. The distance between the points $(a\cos\theta + b\sin\theta, 0)\ and\ (0,\ a\sin\theta - b\cos\theta)$ is

   (a) $a^2 + b^2$ (b) $a^2 - b^2$ (c) $\sqrt{a^2 + b^2}$ (d) $\sqrt{a^2 - b^2}$

6. If α and β are zeroes of the polynomial f(x) = x^2- x - 4, then the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ is

   (a) $\frac{15}{4}$ (b) $-\frac{15}{4}$ (c) 4 (d) 15

7. If 7 times the 7th term of an AP is equal to 11 times its 11th term, then its 18th term will be

   (a) 7 (b) 11 (c) 18 (d) 0

8. $If\ a\cos\theta + b\sin\theta = m\ \ and\ a\sin\theta - b\cos\theta = n, then\ a^2 + b^2$ is equal to

   (a) $m^2 - n^2$ (b) m^2n^2 (c) $n^2 - m^2$ (d) $m^2 + n^2$

9. The value of 2($\sin^2 45°$+ $\cot^2 30°$) – 6($\cos^2 45°$— $\tan^2 30°$) is

   (a) 6 (b) 3 (c) 2 (d) 4

10. The length of a minor arc is $\frac{2}{8}$ of the circumference of the circle. Then the measure of the angle subtended by the arc at the centre of the circle is

    a) 60^0 b) 70^0 c) 80^0 d) 90^0

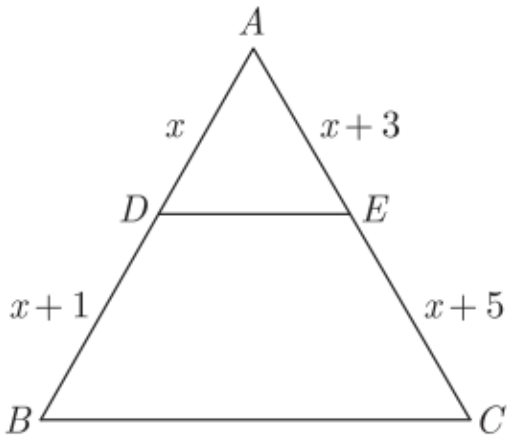
11. If $\frac{1}{2}$ is a root of the quadratic equation $x^2 + kx - \frac{5}{4} = 0$, then the value of k is

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

12. If the sum of n terms of an A.P. is $3n^2$+5n, then which of its terms is 164?

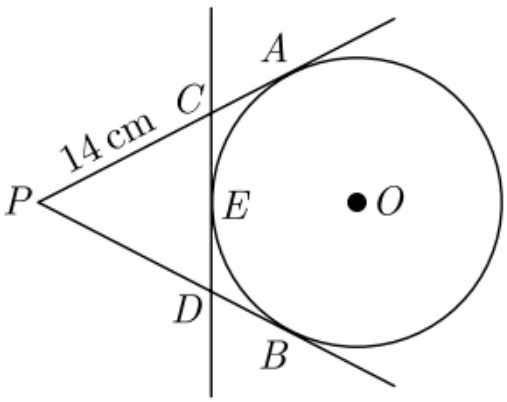
    (a) 26^{th} (b) 27^{th} (c) 28^{th} (d) None of these

13. In ΔABC, DE||BC ,then the value of x will be



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

14. From an external point P, tangents PA and PB are drawn to a circle with centre O. If CD is the tangent to the circle at a point E and PA = 14 cm, then the perimeter of triangle PCD is



    (a) 14 cm (b) 21 cm (c) 28 cm (d) 35 cm

15. The equation $2x^2 + 2(p+1)x + p = 0$, where p is real, always has roots that are
    (a) Equal (b) Equal in magnitude but opposite in sign (c) Irrational (d) Real
16. 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 the value of k is
    (a) 1 (b) 2 (c) -2 (d) -1
17. The sum of a two digit number and the number obtained by interchanging the digits is 132. If the two digits differ by 2, then the number is
    (a) 45 (b) 75 (c) 85 (d) 115
18. If the HCF of 65 and 117 is expressible in the form 65m-117, then the value of m is
    (a) 4 (b) 2 (c) 11 (d) 3

ASSERTION REASONING QUESTIONS

In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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 but 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 sum and product of the zeroes of a quadratic polynomial are $-\frac{1}{4}$ and $\frac{1}{4}$ respectively. Then the quadratic polynomial is $4x^2 + x + 1$.
    Reason (R): The quadratic polynomial whose sum and product of zeroes are given is $x^2 - (sum\ of\ zeroes)x + product\ of\ zeroes$.
20. **Assertion(A):** The value of $\sin\theta = \frac{4}{3}$ is not possible
    Reason (R): Hypotenuse is the largest side of any right angled triangle.

SECTION B

Section B consists of 5 questions of 2 marks each.

21. If α and β are the zeroes of the polynomial $2x^2 - 5x + 7$, then find the polynomial whose zeroes are $2\alpha + 3\beta, 3\alpha + 2\beta$.
22. Find the nature of the roots of the quadratic equation $x^2 - 4x + 3 = 0$.
23. (a) P(-2,5) and Q(3,2) are two points. Find the coordinates of the point R on PQ such that PR=2QR.

    OR

    (b) In what ratio does the X-axis divide the line segment joining the points (-4,-6) and (-1,7)? Find the coordinates of the point of division.
24. (a) How many natural numbers are there between 1 and 1000 which are divisible by 5 but not by 2?

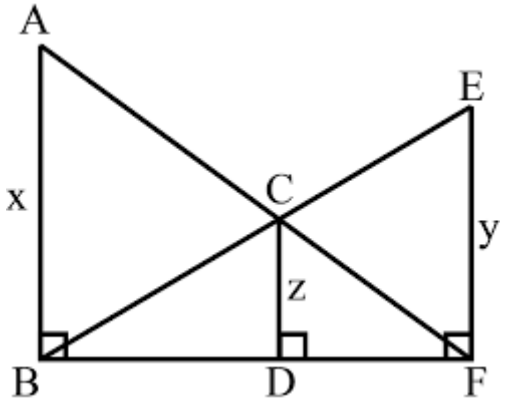
    OR

    (b) If the sum of first m terms of an AP is same as the sum of its first n terms(m≠n), then show that the sum of its first (m+n) terms is zero.
25. Find the length of the shadow on the ground of a pole of height 18 m when angle of elevation θ of the sun is such that $\tan\theta = \frac{6}{7}$.

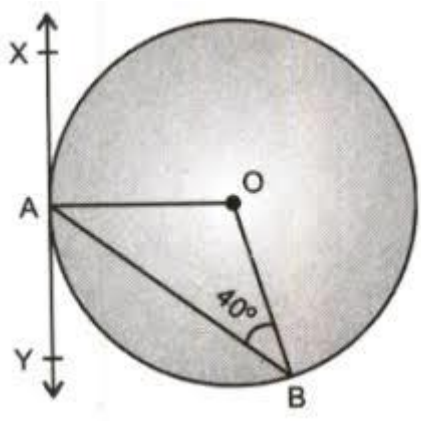
SECTION C

Section C consists of 6 questions of 3 marks each

26. In Figure, AB‖CD‖EF , AB=x units, EF=y units and CD=z units. Prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$.



27. In the given figure, XAY is a tangent to the circle centred at O. If $\angle ABO = 40°$, then find $\angle BAY \text{ and } \angle AOB$.



28. (a) Prove that $\frac{\sin A - \cos A + 1}{\sin A + \cos A - 1} = \frac{1}{\sec A - \tan A}$

OR

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

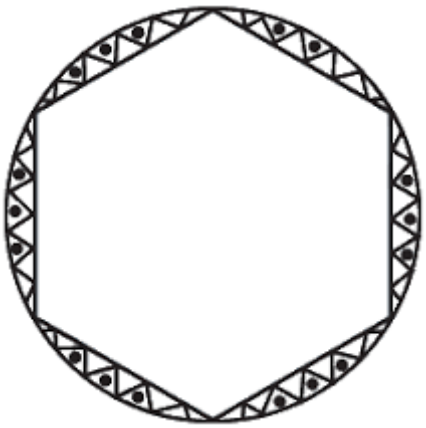
29. (a) Solve $2x + 3y = 11 \text{ and } 2x - 4y = -24$ and hence find the value of m for which y=mx+3.

OR

(b) Sumit is 3 times as old as his son. Five years later, he shall be two and a half times as old as his son. How old is sumit at present?

30. Prove that $\sqrt{3}$ is an irrational number.

31. A round table cover has six equal designs as shown in the figure. If the radius of the cover is 28 cm, find the cost of making the designs at the rate of Rs. 0.35 per cm^2. (Use $\sqrt{3}$ = 1.7)



SECTION D

Section D consists of 4 questions of 5 marks each

32. (a) The angle of elevation of the top of a tower 30 m high from the foot of another tower in the same plane is 60° and the angle of elevation of the top of the second tower from the foot of the first tower is 30°. Find the distance between the two towers and also the height of the other tower.

OR

b) The angle of elevation of the top of a tower from a certain point on the ground is 30°. If the observer moves 20 metres towards the tower, the angle of elevation of the top increases by 15°. Find the height of the tower.

33. (a) It can take 12 hours to fill a swimming pool using two pipes. If the pipe of larger diameter is used for 4 hours and the pipe of smaller diameter for 9 hours, only half the pool can be filled. How long would it take for each pipe to fill the pool separately?

OR

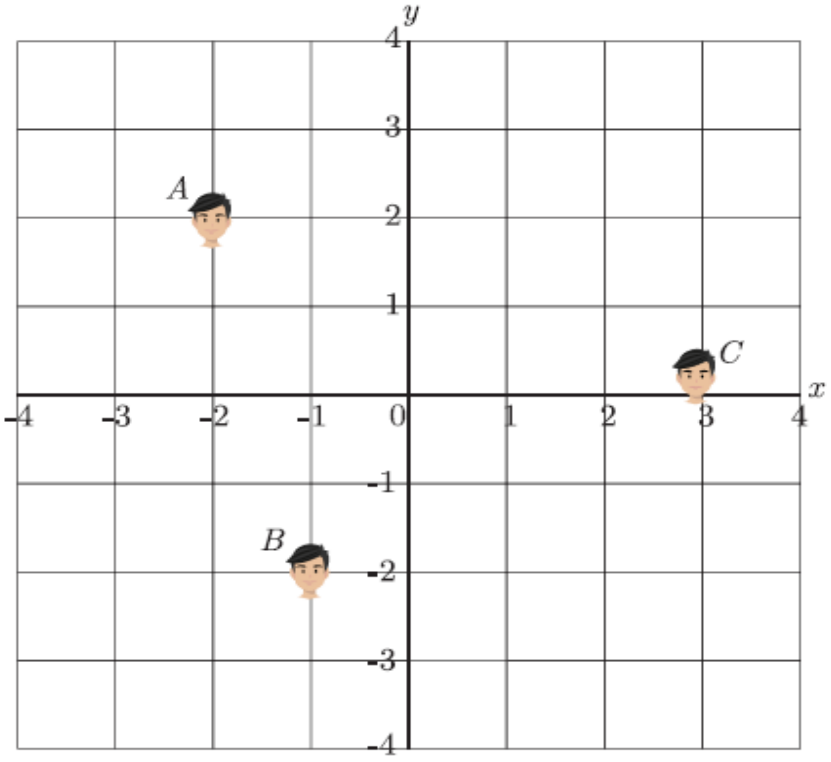
(b) In a class test, the sum of Arun's marks in Hindi and English is 30. If he got 2 marks more in Hindi and 3 marks less in English, the product of the marks would have been 210. Find his marks in the two subjects.

34. Draw the graph of the pair of equations $2x + y = 4$ *and* $2x - y = 4$. Write the vertices of the triangle formed by these lines and the y-axis. Also find the area of this triangle.
35. State and prove Basic Proportionality Theorem.

SECTION E

36. **Case Study 1:**

Ajay, Bhigu and Colin are childhood friends. They always want to sit in a row in the classroom. But teacher doesn't allow them and rotate the seats row-wise every day. Bhigu is very good in maths and he does distance calculation every day. He considers the centre of class as origin and marks their position on a paper in a co-ordinate system. One day Bhigu make the following diagram of their seating position where Ajay, Bhigu and Colin are siting at the positions A,B and C respectively.



Based on the above information, answer the following questions:

i. How far is Ajay sitting from the origin ? 1

ii. What is the distance between Ajay and Bhigu ? 1

iii. (a) Rahul, monitor of the class, sits at D such that AD :DB = 4 : 3 . What are the coordinates of point D ? 2

OR

(b) What type of triangle is formed by the positions of Ajay, Bhigu and Colin as the vertex of the triangle ? Justify your answer. 2

37. **Case Study 2:**

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

i. Find the amount paid by him in 30^{th} instalment. 1

ii. Find the total amount paid by him up to 20^{th} instalment. 1

iii. (a) What amount does he still have to pay after 30^{th} instalment? 2

OR

(b) If total instalments are 40, find the ratio of the 1^{st} instalment to the last instalment. 2

38. **Case Study 3:**

The revenue (in ₹) of a firm is represented by the polynomial $R(x) = 5x^3 + 4x^2 + 7$, and the expenditure (in ₹) by the firm is represented by the polynomial $E(x) = 3x^3 + 2x - 1$, where x is the number of items produced by the firm in a year.

Based on the above information, answer the following questions:

i. Find the profit polynomial $P(x)$. 1

ii. Find the profit of the firm if number of items produced is 200 in a year. 1

iii. (a) If the firm produces 100 products in a year, find the revenue and profit (in ₹) for the firm using the polynomials. 2

OR

(b) Tax is calculated on the profit using the polynomial $T(y) = 0.3y + 100$, where y represents the profit earned.
Determine the tax amount (in ₹) to be paid on the profit generated from 10 items. 2