



**ANANDALAYA**  
**PERIODIC TEST – 3**  
Class : X

Subject: Mathematics  
Date : 06/01/2020

M.M: 80  
Time: 3 Hours

**General Instructions:**

- (i) All the questions are compulsory.
- (ii) The question paper consists of 40 questions divided into 4 sections A, B, C, and D.
- (iii) Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 8 questions of 3 marks each. Section D comprises of 6 questions of 4 marks each.
- (iv) There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each, and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
- (v) Use of calculators is not permitted

**SECTION-A**

**Q. 1 – Q 10 are multiple choice questions. Select the most appropriate answer from the given options.**

1. The decimal expansion of the rational number  $\frac{14587}{1250}$  will terminating after\_\_\_\_\_ (1)  
(a) one decimal place (b) two decimal places  
(c) three decimal places (d) four decimal places
2. For the following distribution : (1)
- | Marks              | Below 10 | Below 20 | Below 30 | Below 40 | Below 50 | Below 60 |
|--------------------|----------|----------|----------|----------|----------|----------|
| Number of students | 3        | 12       | 27       | 57       | 75       | 80       |
- The modal class is \_\_\_\_\_  
(a) 10 – 20 (b) 20 – 30 (c) 30 – 40 (d) 50 – 60
3. The least number that is divisible by all the numbers from 1 to 10 (both exclusive) is\_\_\_\_ (1)  
(a) 10 (b) 100 (c) 504 (d) 2520
4. Match the column: (1)
- |     |                               |     |                           |
|-----|-------------------------------|-----|---------------------------|
| (1) | $2x + 5y = 10; 3x + 4y = 7$   | (A) | Unique solution           |
| (2) | $2x + 5y = 10; 6x + 15y = 20$ | (B) | Infinitely many solutions |
| (3) | $5x + 2y = 10; 10x + 4y = 20$ | (C) | No common solution        |
- (a) 1 – A, 2 – B , 3 – C (b) 1 – B, 2 – C, 3 – A  
(c) 1 – C, 2 – B, 3 – A (d) 1 – A, 2 – C, 3 – B
5. If  $\sec A = 15/7$  and  $A + B = 90^\circ$ , what is the value of cosec B. (1)  
(a)  $15/7$  (b)  $7/15$  (c)  $8/15$  (d)  $15/8$

6.  $\sin(45^\circ + \theta) - \cos(45^\circ - \theta)$  is equal to \_\_\_\_\_. (1)  
 (a)  $2 \cos \theta$  (b) 0 (c)  $2 \sin \theta$  (d) 1
7. If  $\cos 9\alpha = \sin \alpha$  and  $9\alpha < 90^\circ$ , then the value of  $\tan 5\alpha$  is \_\_\_\_\_. (1)  
 (a)  $\frac{1}{\sqrt{3}}$  (b) 1 (c)  $\sqrt{3}$  (d) 0
8. What is the Y- coordinate of the point which divides the join of  $(-1, 7)$  and  $(4, -3)$  in the ratio 2:3? (1)  
 (a) 2 (b)  $-2$  (c)  $-3$  (d) 3
9. If the distance between the point  $(4, p)$  and  $(1, 0)$  is 5 units, then the value of p is \_\_\_\_\_. (1)  
 (a) 4 only (b)  $\pm 4$  (c)  $-4$  only (d) 0
10. If P(1, 2), Q (4, 6), R (5, 7) and S (a, b) are the vertices of a parallelogram PQRS, then \_\_\_\_ (1)  
 (a)  $a = 2, b = 4$  (b)  $a = 3, b = 4$  (c)  $a = 2, b = 3$  (d)  $a = 3, b = 5$

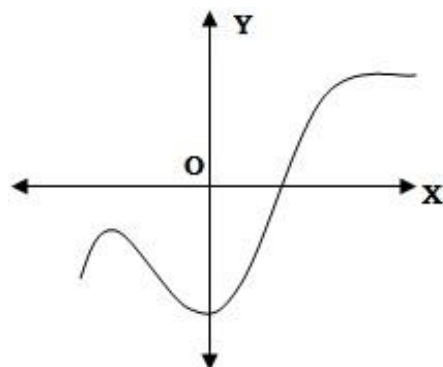
**(Q 11 – Q 15) Fill in the blanks**

11. A solid cylinder of radius r and height h is placed over other cylinder of same height and radius. The total surface area of the shape so formed is \_\_\_\_\_. (1)
12. If the product of the zeroes of  $x^2 - 3kx + 2k^2 - 1$  is 7, then the values of k are \_\_\_\_ and \_\_\_\_\_. (1)

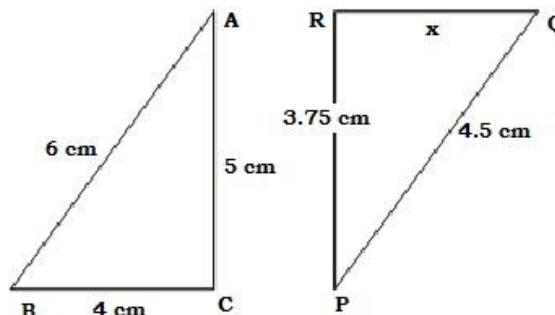
**OR**

The graph of  $y = p(x)$ , where  $p(x)$  is a polynomial in variable x, is as follows:

The number of zeroes of  $p(x)$  is \_\_\_\_\_.



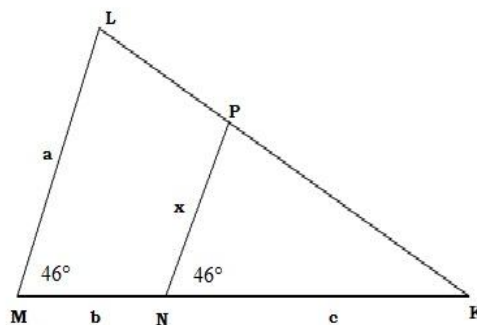
13. In the given figure, if  $\triangle ABC \sim \triangle PQR$ ,  
 The value of x is \_\_\_\_\_ (1)



14. If  $p - 1, p + 3, 3p - 1$  are in AP, then p is equal to \_\_\_\_\_. (1)
15. The probability of a non-leap year having 53 Sundays is \_\_\_\_\_. (1)

**(Q 16 – Q 20) Answer the following**

16. Write the sum of exponents of prime factors in the prime factorization of 250. (1)
17. In the given figure  $\angle M = \angle N = 46^\circ$ , express  $x$  in terms of  $a$ ,  $b$  and  $c$ , where  $a$ ,  $b$  and  $c$  are lengths of  $LM$ ,  $MN$  and  $NK$  respectively. (1)



18. A quadrilateral ABCD is drawn to circumscribe a circle. If  $AB = 12$  cm,  $BC = 15$  cm and  $CD = 14$  cm, then find  $AD$ . (1)

**OR**

What is the distance between two parallel tangents of a circle of radius 7 cm?

19. If the sum of first  $m$  terms of an AP is  $2m^2 + 3m$ , then what is its second term? (1)
20. What the nature of roots of quadratic equation:  $4x^2 + 6x + 3 = 0$ . (1)

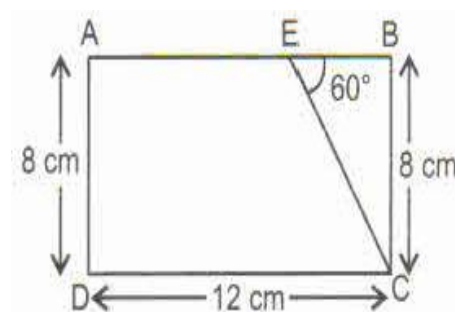
**SECTION-B**

21. Find the sum of all multiple of 8 lying between 201 and 950. (2)
22. Prove that the parallelogram circumscribing a circle is a rhombus. (2)
23. An aeroplane leaves an airport and flies due north at a speed of 1000 km per hour. At the same time, another aeroplane leaves the same airport and flies due west at a speed of 1200 km per hour. How far apart will be the two planes after  $1\frac{1}{2}$  hours? (2)

**OR**

Prove that the area of an equilateral triangle described on one side of a square is equal to half the area of the equilateral triangle described on one of its diagonals.

24. In the given figure, ABCD is a rectangle with  $AD = 8$  cm and  $CD = 12$  cm. Line segment CE is drawn, making an angle of  $60^\circ$  with  $AB$ , intersecting  $AB$  at E. Find the length of CE and BE. (2)



25. A bag contains 5 white balls, 7 red balls, 4 black balls and 2 blue balls. One ball is drawn at random from the bag. What is the probability that the ball drawn is (i) white or blue (ii) red or black? (2)

**OR**

A box contains 19 balls bearing numbers 1, 2, 3, 4, ..., 19. A ball is drawn at random from the box. What is the probability that the number on the ball is (i) a prime number (ii) divisible by 3 or 5.

26. The radii of the bases of two right circular solid cones of the same height are  $r_1$  and  $r_2$  respectively. The cones are melted and recast into a solid sphere of radius  $R$ . Show that the height of each cone is given by  $h = \frac{4R^3}{r_1^2 + r_2^2}$ . (2)

### SECTION-C

27. Given that  $\sqrt{3}$  is an irrational number, prove that  $(2 + \sqrt{3})$  is an irrational number. (3)

OR

If the HCF of 152 and 272 is expressible in the form  $272 \times 8 + 152x$ , then find  $x$ .

28. If the  $p^{\text{th}}$ ,  $q^{\text{th}}$  and  $r^{\text{th}}$  terms of an AP be  $x$ ,  $y$  and  $z$  respectively, show that  $x(q - r) + y(r - p) + z(p - q) = 0$  (3)

29. Form the pair of linear equations in the following problem and find their solutions (if it exist) by any algebraic method: (3)

A part of monthly hotel charges is fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 20 days she has to pay ₹ 1000 as hostel charges where as a student B, who takes food for 26 days, pays ₹ 1180 as hostel charges. Find the fixed charges and the cost of food per day.

OR

Solve for  $x$  and  $y$ :  $8x - 9y = 6xy$  and  $10x + 6y = 19xy$  where  $x, y \neq 0$ .

30. If the polynomial  $6x^4 + 8x^3 + 17x^2 + 21x + 7$  is divided by another polynomial  $3x^2 + 4x + 1$ , the remainder comes out to be  $(ax + b)$ , find  $a$  and  $b$ . (3)

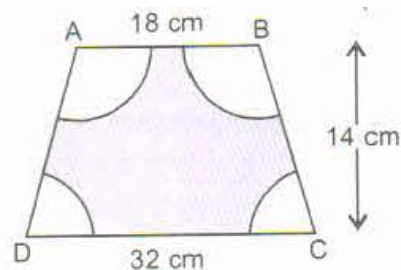
31. Two point A (1, 0) and B (-1, 0) with a variable point P (x, y) satisfy the relation  $AP = BP = 1$ . Show that  $12x^2 - 4y^2 = 3$ . (3)

32. If  $\tan\theta + \sin\theta = m$  and  $\tan\theta - \sin\theta = n$ , show that  $m^2 - n^2 = 4\sqrt{mn}$ . (3)

OR

Evaluate:  $\frac{\sin 15^\circ \cos 75^\circ + \cos 15^\circ \sin 75^\circ}{\tan 5^\circ \cdot \tan 30^\circ \cdot \tan 35^\circ \cdot \tan 55^\circ \cdot \tan 85^\circ}$

33. In figure ABCD is trapezium with  $AB \parallel DC$ ,  $AB = 18$  cm,  $DC = 32$  cm and distance between  $AB$  and  $DC = 14$  cm. If areas of equal radii 7 cm with centre A, B, C and D have been drawn, and then find the area of the shaded region. (3)



34. The following distribution gives the daily income of 50 workers of a factory: (3)

Daily Income (in ₹)	100 – 120	120 – 140	140 – 160	160 – 180	180 – 200
Number of workers	12	14	8	6	10

Convert the distribution above to a 'less than type' cumulative frequency distribution and draw its ogive.

### SECTION-D

35. Draw an isosceles triangle ABC in which the base BC is 8 cm long and its altitude AD through A is 4 cm long. Then draw another triangle whose sides are  $\frac{2}{3}$  of the corresponding sides of the  $\triangle ABC$ . (4)

**OR**

Draw a pair of tangents to a circle of radius 4 cm which are inclined to each other at an angle of  $45^\circ$ .

36. State and prove the Pythagoras theorem. (4)

37. A trader bought a number of articles for ₹ 900, five articles were found damaged. He sold each of the remaining articles at ₹ 2 more than what he paid for it. He got a profit of ₹ 80 on the whole transaction. Find the number of articles he bought. (4)

**OR**

A two digit number is such that product of its digits is 18. When 63 subtracted from the number, the digits interchange their places. Find the number.

38. A tent consists of a frustum of a cone, surmounted by a cone. If the diameter of the upper and lower circular ends of the frustum are 14m and 26m respectively, the height of the frustum is 8 m and the slant height of the surmounted conical portion is 12 m, find the area of canvas required to make the tent. (Assume that the radii of the upper circular end of the frustum and the base of surmounted conical portion are equal) (4)

**OR**

The  $\frac{3}{4}$  th part of a conical vessel of internal radius 5 cm and height 24 cm is full of water. The water is emptied into a cylindrical vessel with internal radius 10 cm. Find the height of water in cylindrical vessel.

39. The height of a hill 3300 metres. From a point P on the ground the angle of elevation of the top of the hill  $60^\circ$ . A balloon is moving with constant speed vertically upwards from P. After 5 minutes of its movement, a person sitting in it observes the angle of elevation of the top of the hill as  $30^\circ$ . What is the speed of the balloon? (4)

40. The following distribution gives the state wise teacher student ratio in higher secondary schools of India. Find the mode of this data. (4)

Number of students per teacher	15 – 20	20 – 25	25 – 30	30 – 35	35 – 40	40 – 45	45 – 50	50 – 55
Number of states / UT	3	8	9	10	3	0	0	2