NEW HORIZON GURUKUL

Periodic Test - III / Pre - Board - I 2020-21

Class: X **Max. Marks: 80**

Subject: Mathematics **Time: 3 hours**

General Instructions:

I. Write your answers neatly and **send it in a single pdf form** with proper details **(Full Name, Roll Number – 5 digits, Section, Date)** at the email address **math10.nhg@gmail.com** within half an hour of completion of the time given.

II. This question paper contains two parts A and B.

III. Both Part A and Part B have internal choices.

Part – A:

1. It consists of two sections - I and II.
2. Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
3. Section II has 4 questions on case study. Each case study has 5 case-based sub-parts. Each sub –part carries 1 mark. An examinee is to attempt any 4 out of 5 sub-parts.

Part – B:

1. Question No 21 to 26 are Very short answer Type questions of 2 mark each.
2. Question No 27 to 33 are Short Answer Type questions of 3 marks each.
3. Question No 34 to 36 are Long Answer Type questions of 5 marks each.
4. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

IV. Use of calculators is not permitted.

V. All working and diagrams must be shown in the answer paper.

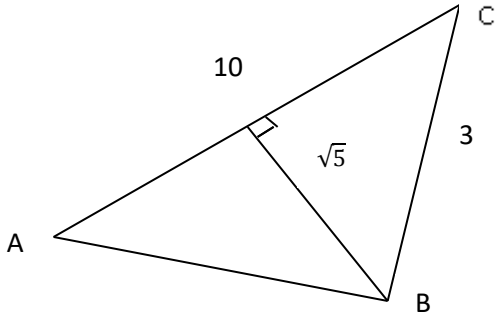
Part A – Section I

1. Find the coordinates of a point A, where AB is a diameter of a circle whose centre is (2, -3) and B is the point (1, 4).
2. Evaluate : $sin^2 60° + 2tan^2 45° - cos^2 30°$

   OR

   If sin A $= \frac{3}{4}$, calculate sec A
3. A sector of 56° cut out from a circle contains area 4.4cm^2. Find the radius of the circle.

4. If a tower of 30m high casts a shadow $10\sqrt{3}$m long on the ground, find the angle of elevation of the sun.
5. A class consists of 12 girls and 20 boys. One quarter of the girls in the class have blue eyes. If a child is selected at random from the class, what is the probability that the child is a girl who does not have blue eyes?
6. If a half full 4 inch by 2 inch by 8 inch box of soymilk is poured unto a right circular cylindrical glass of radius 2 inches, how many inches high will the soymilk reach?
7. In the given figure, what is the length of side AB?



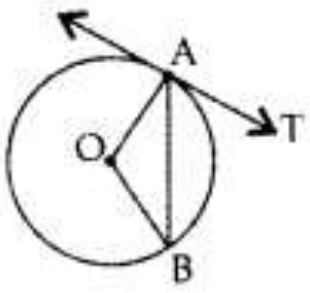
8. How many terms of the AP 65, 60, 55 … are to be taken so that their sum is zero?

   OR

   For what value of 'k', are k + 9, 2k -1 and 2k + 7 the consecutive terms of an A.P.?
9. Find the distance between the points (0, 5) and (-5, 0).
10. Find the discriminant of the quadratic equation $3\sqrt{3}\,x^2 + 10x + \sqrt{3} = 0$

    OR

    If x = – 12 is a solution of the quadratic equation $3x^2 + 2kx – 3 = 0$, find the value of k.
11. If the zeros of a quadratic polynomial $ax^2 + bx + c$ are both negative, can we say a, b and c all have the same sign? Justify your answer.
12. In the given figure, O is the centre of a circle, AB is a chord and AT is the tangent at A. If ∠AOB=100°, then calculate ∠BAT.



13. Find the sum of first five positive integers divisible by 6.

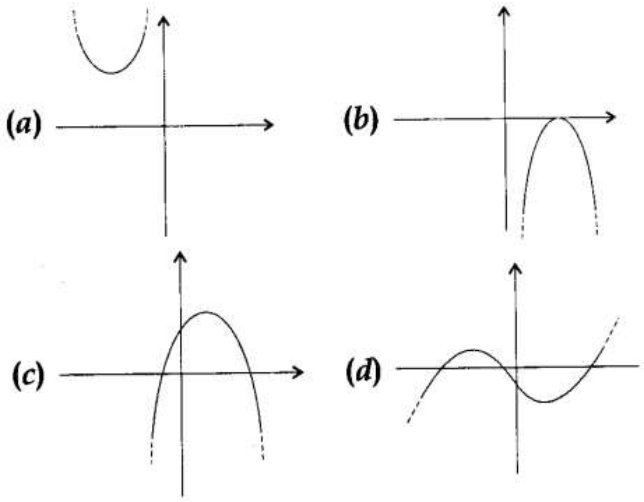
    OR

    If the sum of the first p terms of an AP is $ap^2 + bp$, find its common difference.

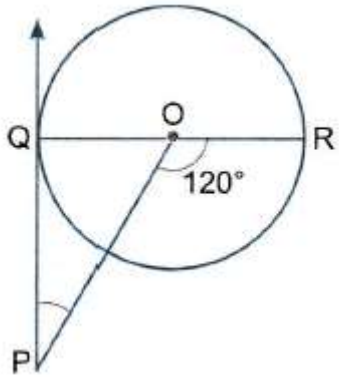
14. If one root of $5x^2 + 13x + k = 0$ is the reciprocal of the other root, then find the value of k.

OR

Which of the following is not the graph of quadratic polynomial?



15. PQ is a tangent drawn from an external point P to a circle with centre O and QOR is the diameter of the circle. If ∠POR= 120°, what is the measure of ∠OPQ?



16. To find a point P on the line segment AB = 6 cm such that $\frac{AP}{AB} = \frac{2}{5}$, in which ratio the line segment AB is divided?

Part A – Section II

17. A fruit vendor was selling apples in packing boxes containing varying amount of apples

No. of APPLES	25 - 30	30 - 35	35 - 40	40 - 45	45 - 50	50 – 55
No. of BOXES	25	34	50	42	38	13

i. Estimate the mode of apples kept in a packing box

(a) 37 (b) 38.3 (c) 36.7 (d) 53.8

ii. What will be the lower limit of median class?

(a) 40 (b) 45 (c) 30 (d) 35

iii. Which of the following is not a measure of central tendency?

(a) Class interval (b) Median (c) Mean (d) Mode

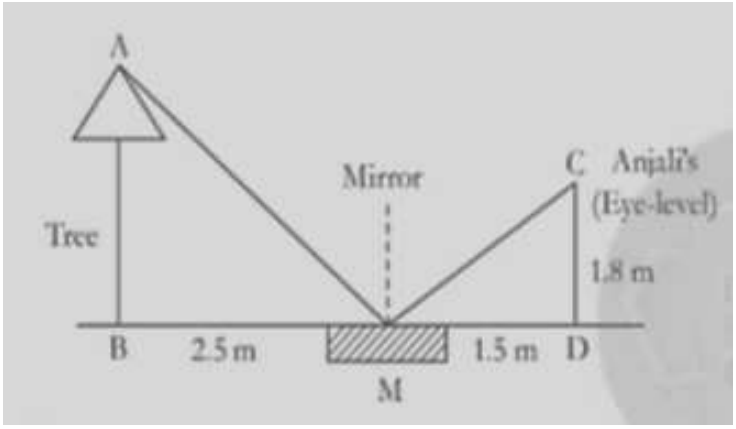
iv. The difference of upper limits of modal class and median class is

(a) 70 (b) 0 (c) 5 (d) 80

v. How many boxes contain more than 40 apples?

(a) 51 (b) 109 (c) 93 (d) 126

18. Teacher gives an activity to the students to measure the height of the tree and asks them who will do this activity. Anjali accepts the challenge she places a mirror on level ground to determine the height of a tree. She stands at a certain distance so that she can see the top of the tree reflected from the mirror. Anjali's eye level is 1.8m above the ground. The distance of Anjali and the tree from the mirror is 1.5m and 2.5m respectively.



(i) Name the two similar triangles formed in diagram.

(a) $\Delta ABM \sim \Delta \mathrm{CMD}$

(b) $\Delta AMB \sim \Delta\ \mathrm{CDM}$

(c) $\Delta ABM \sim \Delta\ \mathrm{CDM}$

(d) None of these

(ii) State the criteria of similarity that is applicable here

(a) SSS criterion

(b) SAS criterion

(c) AAA criterion

(d) ASA criterion

(iii) Find the height of the tree.

(a) 3m (b) 3.5m (c) 2.5m (d) 4m

(iv) In ΔABM, if angle BAM = 30^o, then find angle MCD.

(a) 40^o (b) 45^o (c) 60^o (d) 30^o

(v) If ΔABM and ΔCDM are similar, CD = 6 cm, MD = 8 cm and BM = 24cm, then AB =

(a) 17 cm (b) 18 cm (c) 12 cm (d) 24 cm

19. To make teaching-learning process easier, creative and innovative, a teacher brings clay in the classroom to teach the topic mensuration. She thought this method of teaching is more interesting, leaves a long lasting impact. She forms a cylinder of radius 6 cm and height 8 cm with the clay. Then she remoulds the cylinder into a sphere and asks some questions to students.

(i) The radius of the sphere so formed

(a) 6cm (b) 7cm (c) 4cm (d) 8cm

(ii) The volume of the sphere so formed

(a) 902.32 cm^3 (b) 899.34cm^3 (c) 904.32cm^3 (d) 999.33cm^3

(iii) What is the ratio of volume of sphere to the volume of a cylinder

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

(iv) The total surface area of the cylinder is

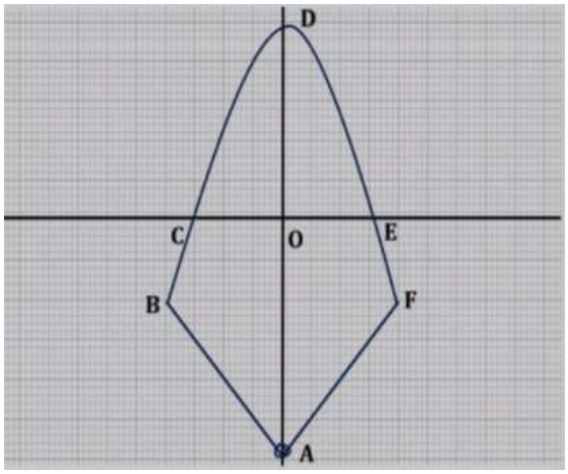
(a) 525.57 cm^2 (b) 557.55cm^2 (c) 534.32cm^2 (d) 527.52cm^2

(v) During the conversion of a solid from one shape to another the volume of the new shape will

(a) increase (b) decrease

(c) remain unchanged (d) be doubled

20. Charu is cycling in a park. He chooses a path which is a closed curve, partly parabolic. At the point where Charu started, the path forms a right angle. Charu makes a complete round on the path. The graph shows the path of cycling. D is vertex of parabolic curve which intersects X axis at C and E. Also $\angle BAF$ is a right angle.



(i) If BAF is an isosceles triangle then distance between points B and F is:

(a) 6 units (b)8 units (c)10 units (d)12 units

(ii) At a specific time, Charu is standing at a point R (-8, 6) in the park. If there is a light pole in the park which is situated at origin in the graph and the angle of elevation of the top of the light pole is 60° from point R, find the height of the light pole.

(a) 8 units (b)$12\sqrt{3}$ units (c) $10\sqrt{3}$ units (d) $14\sqrt{3}$ units

(iii) Find the coordinates of the point P which divides line segment joining points B and F in 3:5.

(a) (2, -1) (b) (-2, 1) (c) (1, 2) (d) (-1, -2)

(iv) From the graph, the equation for the parabolic part of the graph is:

(a) $x^2 - 6x - 9 = 0$

(b) $x^2 - 9 = 0$

(c) $x^2 - 6 = 0$

(d) $x^2 - 6x + 9 = 0$

(v) If the length of the track is 1km and the boy is moving with the speed of 18km/h and if he increases his speed by 6km/h, find the time saved by the boy in completing one round of the path

(a) 50 sec (b) 20 sec (c) 45 sec (d) 15 sec

Part B

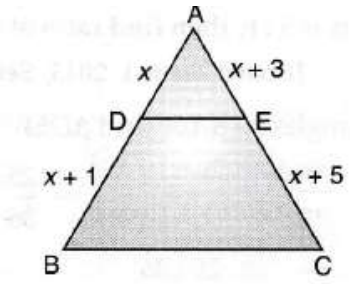
21. Two circular pieces of equal radii and maximum areas, touching each other are cut out from a rectangular cardboard of dimensions 14cm × 7cm. Find the area of the remaining cardboard. (Use $\pi = \frac{22}{7}$)

22. Draw a line segment of length 5cm and divide it in the ratio 3:7.

23. In ΔABC, if X and Y are points on AB and AC respectively such that $\frac{AX}{XB} = \frac{3}{4}, AY = 5$ and $YC = 9$, then state whether XY and BC are parallel or not.

    OR

    In $\Delta ABC, DE \parallel BC$, find the value of x.



24. Find the nature of the roots of the quadratic equation : $13\sqrt{3}x^2 + 10x + \sqrt{3} = 0$

    OR

    Find the roots of the quadratic equation using formula: $15x^2 - 10\sqrt{6}x + 10 = 0$

25. The sum of first n terms of an AP is $5n - n^2$. Find the n^{th} term of the AP.

26. Find the quadratic polynomial if its zeroes are 0 and √5.

27. If $4sin\theta = 3$, find the value of x if $\sqrt{\frac{cosec^2\theta - cot^2\theta}{sec^2\theta - 1}} + 2cot\theta = \frac{\sqrt{7}}{x} + cot\theta$

28. Find the area of the shaded region in figure (a) below, if BC = BD = 8cm, AC = AD = 15 cm and O is the centre of the circle. (Take $\pi = 3.14$)

    OR

    In the figure (b) below, AB is the diameter of the largest semicircle. AB = 21cm, AM=MN=NB. Semi circles are drawn with AM, MN and NB as shown. Using $\pi = \frac{22}{7}$, calculate the area of the shaded region.

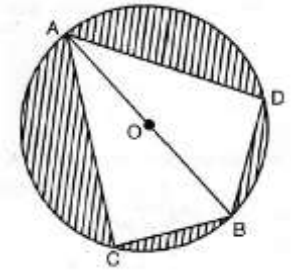


figure (a)

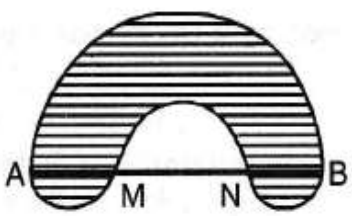


figure (b)

29. Prove that the parallelogram circumscribing a circle is a rhombus.
30. If the seventh term of an AP is 1/9 and its ninth term is 1/7, find its 63rd term.
31. Prove that in a right angled triangle, the square of hypotenuse is equal to the sum of the squares of other two sides.
32. Obtain all zeroes of $3x^4 - 15x^3 + 13x^2 + 25x - 30$, if two of its zeroes are $\pm\sqrt{\frac{5}{3}}$.

    OR

    If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are in an AP, then find the values of 'a' and 'b'.
33. The points A (-1, y) and B (5, 7) lie on a circle with centre O (2, -3y). Find the value(s) of y. Hence find the radius of the circle.
34. Two ships are approaching a light house from opposite directions. The angles of depression of two ships from top of the light house are 30° and 45°. If the distance between two ships is 100m, find the height of the light house.
35. Find the mean of the following distribution:

Height (in cm)	Less than 75	Less than 100	Less than 125	Less than 150	Less than 175	Less than 200	Less than 225	Less than 250	Less than 275	Less than 300
No. of students	5	11	14	18	21	28	33	37	45	50

    OR

    If the mean of the following data is 14.7, find the values of p and q.

Upper limits	6	12	18	24	30	36	42	**Total**
Frequency	10	p	4	7	q	4	1	**40**

36. Do as directed:
    i. Solve the equation $9x^2 - 6b^2x - (a^4 - b^4) = 0$ using factorization method:
    ii. Find the value of p, for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other.