NEW HORIZON GURUKUL

PRE-BOARD EXAMINATION - 2020

MATHEMATICS (041)

Class – X

(Set 1)

Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

a) All questions are compulsory
b) The question paper consists of 40 questions divided into four sections A, B,C, & D.
c) 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.
d) There is no overall choice. However internal choices have been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each and 3 questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
e) Use of calculators is not permitted.

Section A

1. The HCF of smallest composite number and the smallest prime number is
   a) 0 b) 1 c) 2 d) 3

2. For the following distribution, the sum of lower limits of the median class and the modal class is

C.I	0 – 5	5 - 10	10 – 15	15 – 20	20 – 25
Frequency	10	15	12	20	9

   a) 15 b) 25 c) 30 d) 35

3. The largest number which divides 70 and 125, leaving remainders 5 and 8 respectively is
   a) 13 b) 65 c) 875 d) 1750

4. If a pair of linear equation is consistent, then the lines will be
   a) parallel b) always coincident
   c) intersecting of coincident d) always intersecting

5. Given that $\sin\theta = \frac{a}{b}$, then $\cos\theta =$

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

6. If $\tan 2A = \cot(A - 18)^0$, where 2A is an acute angle, the value of A is

a) 29^0 b) 30^0 c) 26^0 d) 36^0

7. Given that $\sin\alpha = ½$ and $\cos\beta = ½$, then value of $(\alpha + \beta)$ is

a) 0^0 b) 30^0 c) 60^0 d) 90^0

8. If P(–1 , 1) is the mid point of the line segment joining A(–3, b) and B(1, b+4), then the value of b is

a) 1 b) –1 c) 2 d) 0

9. The distance between the point P(–6, 8) from the origin is:

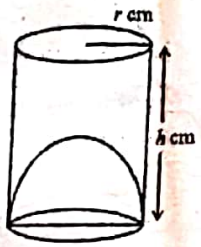
a) 8 b) 27 c) 10 d)6

10. Point on X-axis has coordinates:

a) (a, 0) b) (0, a) c) (–a , a) d) (a, –a)

(Q.11 – Q.15) Fill in the blanks.

11. The capacity of a cylindrical vessel with hemispherical portion raised upward at the bottom as shown in the figure is ----------



12. The value of k for which the roots of the equation $kx(3x - 4) + 4 = 0$ are equal is ----------

OR

If 1 is a zero of the polynomial $p(x) = ax^2 - 3(a - 1)x - 1$, then value of a is----------

13. In ΔABC, DE||BC and AD = 2.4 cm, AE = 3.2 cm and EC = 4.8 cm. Then AB = ----------

14. The 21st term of an AP whose first two terms are –3 and 4 is ----------

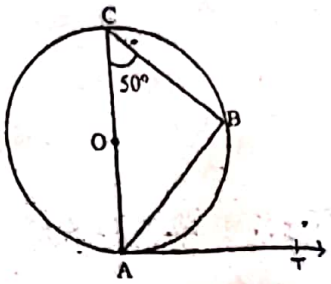
15. A card is selected from a deck of 52 cards. The probability of it being a red face card is ----------

(Q.16 – Q.20) Answer the following

16. In ΔABC, DE||BC so that AD = (7x – 4) cm, AE = (5x – 2) cm, DB = (3x + 4) cm and EC = 3x cm. Find x.

17. The HCF of two numbers is 23 and their LCM is 1449. If one of the number is 161, find the other.

18. In figure AB is a chord of a circle and AOC is its diameter such that <ACB = 50^0. If AT is a tangent to the circle at the point A, find the measure of <BAT.



OR

If a chord AB subtends an angle 60^0 at the centre of a circle, then find the angle between the tangent at A and B.

19. The sum of first n terms of an AP is $3n^2 + 6n$. Find the common difference.

20. Find the value of k for which the following system of linear equations has an infinite number of solutions.

$2x + 3y = 7$

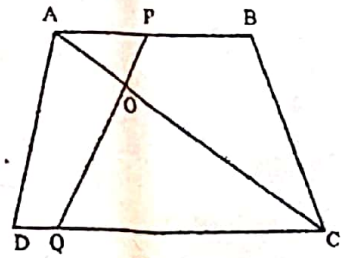
$(k-1)x + (k+2)y = 3k$

Section B

21. If 5 times the fifth term of an AP is equal to 8 times the eighth term, show that its 13^{th} term is 0.

22. Prove that the parallelogram circumscribing a circle is a rhombus.

23. In figure, if AB||DC and AC and PQ intersect each other at the point O, prove that OA.CQ = OC.AP



OR

In a trapezium ABCD, O is the point of intersection of AC and BD, AB||CD and AB = 2CD. If the area of ΔAOB = 84 cm^2, find the area of ΔCOD.

24. A submarine is a type of watercraft designed to function under water. It is a kind of naval vessel typically used for military purposes. Here a submarine at the surface of an ocean makes an emergency dive, its path making an angle 30^0 with the surface. If it goes 300m long its downward path, how deep will it be?

25. Cards numbered 11 to 60 are kept in a box, find the probability that the number on the drawn card is
i) a perfect square number
ii) a prime number less than 20

OR

A child has a die whose 6 faces show the letters given below:

A	B	C	A	D	A

The die is thrown once. What is the probability of getting i) A ii) D

26. A farmer wants to dig a well either in the form of cuboid of dimensions 1m x 2m x 7m or in the form of a cylinder of diameter 1m and depth 7m. The rate to dig the well is Rs. 50/m^3. Find the cost to dig both wells. Which one will cost more?

Section C

27. Prove that $\sqrt{3}$ is irrational.

OR

Show that every positive odd integer is of the form (6m + 1) or (6m + 3) or (6m + 5) for some integer m.

28. The sum of first 6 terms of an AP is 42. The ratio of its 10^{th} term to 30^{th} term is 1:3. Find the first and 13^{th} terms of the AP.

29. Solve the following system of equations:

$$\frac{5}{x-1} + \frac{1}{y-2} = 2$$
$$\frac{6}{x-1} - \frac{3}{y-2} = 1$$

OR

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

30. Find all the zeros of $2x^4 - 3x^3 - 5x^2 + 9x - 3$, it being given that two of its zeros are $\sqrt{3}$ and $-\sqrt{3}$.

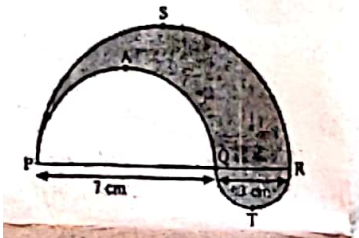
31. Jaspal started walking from his house to office. Instead of going to office directly, he goes to a bank first, from there to his daughter's school, and then reaches the office. What is the extra distance travelled by Jaspal in reaching office, if the house is situated at (2, 4), bank at (5, 8), school at (13, 14) and office at (13, 26).

32. If $(\text{cosec}A - \sin A) = a^3$ and $(\sec A - \cos A) = b^3$, Prove that $a^2b^2(a^2 + b^2) = 1$

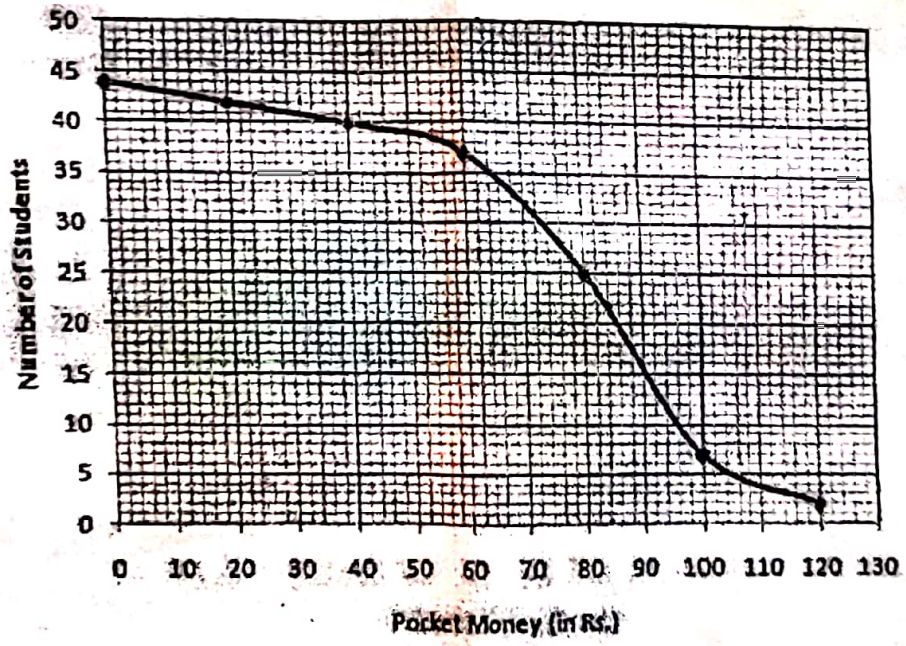
OR

Evaluate $\dfrac{\sin^2 45^0 + \frac{3}{4}cosec^2 30^0 - cos 60^0 + \tan^2 60^0}{\sin^2 30^0 + cos^2 60^0 + \frac{1}{2}sec^2 45^0}$

33. In the figure given below, PSR, RTQ and PAQ are three semicircles of diameters 10cm, 3cm and 7cm respectively. Find the perimeter of the shaded region.



34. Raju collected the details of weekly pocket money received by students of his class. The total number of students is 44. After collecting the data, he analysed the data and prepared a report on the weekly pocket money received by students of his class. Using this report, he drew the following graph.



Based on the above graph, answer the following questions:

i) Form the frequency distribution table for the data.

ii) Find the median weekly pocket money received by students.

iii) Obtain the mode of the data if mean weekly pocket money is Rs. 86.

Section D.

35. Draw an isosceles triangle ABC in which AB = AC = 6cm and BC = 5cm. Construct ΔPQR similar to ΔABC in which PQ = 8cm.

OR

Draw a circle of radius 5cm. Draw two tangents to the circle perpendicular to each other.

36. Prove that the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

37. An aeroplane left 30 minutes later than its scheduled time and in order to reach the destination 1500km away in time, it had to increase its speed by 250km/hr from its usual speed. Determine its usual speed.

OR

Solve the following equation:
$9x^2 - 9(a + b)x + (2a^2 + 5ab + 2b^2) = 0$

38. A bucket is in the form of a frustum of a cone of height 30cm with radii of its lower and upper ends as 10cm and 20cm respectively. Find the capacity and surface area of the bucket. Also find the cost of milk which can completely fill the container at the rate of Rs. 25 per litre. (use $\pi = 3.14$)

OR

500 persons are taking a dip into a cuboidal pond which is 80m long and 50m broad. What is the rise in water level in the pond, if the average displacement of water by a person is 0.04 m^3.

39. A 1.2m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60^0. After some time, the angle of elevation reduces to 30^0. Find the distance travelled by the balloon during the interval.

40. An aircraft has 120 passenger seats. The number of seats occupied during 100 flights is given in the following table.

No. of seats	100 - 104	104 – 108	108 – 112	112 – 116	116 – 120
Frequency	15	20	32	18	15

Determine the mean number of seats and modal number of seats occupied over the flights.