BRILLIANT GROUP OF INSTITUTIONS DOHA, QATAR

Pre-Board Examination 2017-18

Class-X

Mathematics

Time allowed: 3 Hours   **Max. Marks: 80**

General Instructions:

(i)   All questions are compulsory.

(ii)   The question paper consists of 30 questions divided into four sections A, B, C and D.

(iii)   Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each. Section D contains 8 questions of 4 marks each.

(iv)   There is no overall choice. However, an internal choice has been provided in four 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
(**Question numbers 1 to 6 carry 1 mark each**)

1. The value of c for which the equation $ax^2 + 2bx + c = 0$ has equal roots is:_____.

2. If $\dfrac{129}{2000} = \dfrac{129}{2^m \times 5^n}$, then find the values of m and n.

3. If $\dfrac{6}{5}$, $a, 4$ are in AP, then find the value of a.

4. In triangle ABC, DE || BC and $\dfrac{AD}{DB} = \dfrac{3}{5}$. If AC = 5.6, find AE

5. Find the value of k if the points A(2, 3), B(4, k) and C(6, –3) are collinear.

6. Find the value of x in the following: $2\sin 3x = \sqrt{3}$

Section B
(**Question numbers 7 to 12 carry 2 marks each**)

7. Cards with numbers 13, 14, 15,………………..60 are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that number on the card drawn is:

   (i) divisible by 5

   (ii) a number is a perfect square

8. Check whether 6^n can end with the digit 0 for any natural number n.

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9. In an A.P. , the sum of first n terms is $\dfrac{3n^2}{2} + \dfrac{5n}{2}$. Find its 25th term.

10. In what ratio does the point $(-4,6)$ divide the line segment joining the points $(-6,10)$ and $(3,-8)$?

11. Two dice are drawn simultaneously. What is the probability that: a) 5 will not come up on either of them, b) 5 will come up on at least one.   C) 5 will come up at both dice.

12. Solve for x and $y : 29x + 41y = 169, \quad 41x + 29y = 181.$

Section C
(Question numbers 13 to 22 carry 3 marks each)

13. Use Euclid's division lemma to show that the cube of any positive integer is of the form $9m, 9m+1$ or $9m+8$.

14. If P(x, y) is any point on the line joining the points A(a, 0) and B(0, b), then show that $\dfrac{x}{a} + \dfrac{y}{b} = 1$.

OR

Determine the ratio in which the line 2x + y – 4 = 0 divides the line segment joining the points A(2, -2) and B(3, 7).

15. The height of a right circular cone is trisected by two planes drawn parallel to the base. Show that the volumes of the three portions starting from the top are in the ratio 1 : 7 : 19.

OR

A right triangle having sides 15cm and 20cm is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed. $(\pi = 3.14)$.

16. Find the zeroes of the polynomial f(x)=x^3 -5x^2 -2x +24, if it is given that the product of its two zeroes is 12.

17. A survey conducted on 20 households in a locality by a group of students resulted in the following frequency table for the number of family members in a household:

| Family Size	1-3	3-5	5-7	7-9	9-11
Number of families	7	8	2	2	1

Find the mode of this data.

18. Draw the graphs of x-y+1 =0 and 3x +2y -12 =0. Determine the coordinates of the vertices of the triangle formed by these lines and x-axis and shade the triangular region. Calculate the area of the triangle formed

19. PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the length TP.

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

OR

State and prove Pythagoras theorem.

21. In figure, ABC is a right angled triangle, right angled at A. Semicircles are drawn on AB, AC and BC as diameters. Find the area of the shaded region.
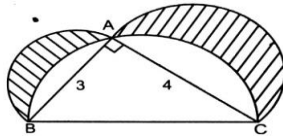
22. Evaluate without using trigonometric tables: $\dfrac{\sin^2 \theta + \sin^2(90-\theta)}{3(\sec^2 61 - \cot^2 29)} - \dfrac{3\cot^2 30 \sin^2 54 \sec^2 36}{2(\cos ec^2 65 - \tan^2 25)}$.

OR

If $x = k\,SinA\,CosB,\ y = k \sin A \sin B$ and $z = k \cos A$ Prove that: $x^2 + y^2 + z^2 = k^2$.

Section D
(Question numbers 23 to 30 carry 4 marks each)

23. A motorboat whose speed in still water is 5km/hr, takes 1 hour more to go 12 km upstream that to return downstream to the same spot. Find the speed of the stream.

OR

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

24. Sum of the first p, q and r terms of an A.P. are a, b and c respectively. Prove that:

$\dfrac{a}{p}(q-r) + \dfrac{b}{q}(r-p) + \dfrac{c}{r}(p-q) = 0$.

25. If $\cos ec\theta - \sin\theta = m\ and\ \sec\theta - \cos\theta = n$, prove that $(m^2 n)^{2/3} + (mn^2)^{2/3} = 1$.

26. Construct an isosceles triangle whose base is 8 cm and altitude 4 cm and then another triangle whose sides are 1½ times the corresponding sides of the isosceles triangle. Write the steps of construction.

27. Two poles of height a meters and b meters are p meters apart. Prove that the height of the point of intersection of the lines joining the top of each pole to the foot of the opposite pole is given by

$\dfrac{ab}{a+b}$ meters.

OR

BL and CM are medians of a triangle ABC right angled at A. Prove that: $4(BL^2 + CM^2) = 5BC^2$.

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28. The median of the following data is 525. Find the values of x and y, if the total frequency is 100.

Class interval	Frequency
0 – 100	2
100 – 200	5
200 – 300	x
300 – 400	12
400 – 500	17
500 – 600	20
600 – 700	y
700 – 800	9
800 – 900	7
900 – 1000	4

OR

Thirty women were examined in a hospital by a doctor and the number of heart beats per minute recorded and summarized as follows. Find the mean heart beats per minute for these women, choosing a suitable method

Number of heart beats/minutes:	65 – 68	68 – 71	71 – 74	74 – 77	77 – 80	80 – 83	83 – 86
Number of women:	2	4	3	8	7	4	2

29. **A farmer wants to dig a well either in the form of cuboid of dimensions (1m x 1m x 7m) or in the form of cylinder of diameter 1 meter and height 7m. The rate to dig the well is Rs. 50/m³. Find the cost to dig both wells. The farmer decides to dig the cylindrical well. By his decision which value is depicted?**

30. If the angle of elevation of a cloud from a point h meters above a lake is α and the angle of depression of its reflection in the lake be β, prove that the height of the cloud from the lake is:

$$\frac{h(\tan\alpha + \tan\beta)}{\tan\beta - \tan\alpha}.$$

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