BRILLIANT GROUP OF INSTITUTIONS DOHA, QATAR

SAMPLE QUESTION PAPER
Class-X (2017–18)
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 roots of the quadratic equation: $kx^2 + 4x + 1 = 0$ are real and equal, then find k.

2. The decimal expansion of $\dfrac{3}{8}$ is:_____.

3. Write the next term of the $\sqrt{8}, \sqrt{18}, \sqrt{32}, \ldots$.

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. Two unbiased coins are tossed simultaneously. Find the probability of getting

   (i) two heads   (ii) one head   (iii) at most one head   (iv) at least one head

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

9. Which terms of the A.P. 8, 14, 20, 26, …will be 72 more than its 41st term.

10. If (1, 2), (4, y), (x, 6) and (3, 5) are the vertices of a parallelogram taken in order, find x and y.

11. Find the probability that a leap year selected at random will contains 53 Sundays

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12. A part of monthly hostel 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 Rs 1000 as hostel charges whereas a student B, who takes food for 26 days, pays Rs 1180 as hostel charges. Find the fixed charges and the cost of food per day.

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

13. Prove that $\sqrt{2}$ is an irrational number and hence show that $\dfrac{3+\sqrt{2}}{2}$ is also an irrational number.

14. In figure, XY and X′Y′ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X′Y′ at B. Prove that $\angle$ AOB = 90°.
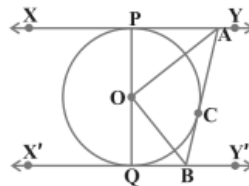
15. Points P, Q, R and S divide the line segment joining the points A(1, 2) and B(6, 7) in 5 equal parts. Find the coordinates of the points P, Q and R.

OR

If A(–5, 7), B(– 4, –5), C(–1, –6) and D(4, 5) are the vertices of a quadrilateral, find the area of the quadrilateral ABCD.

16. A farmer connects a pipe of internal diameter 20 cm from a canal into a cylindrical tank in her field, which is 10 m in diameter and 2 m deep. If water flows through the pipe at the rate of 3 km/h, in how much time will the tank be filled?

OR

Rachel, an engineering student, was asked to make a model shaped like a cylinder with two cones attached at its two ends by using a thin aluminium sheet. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm, find the volume of air contained in the model that Rachel made. (Assume the outer and inner dimensions of the model to be nearly the same.)

17. State and prove Pythagoras theorem.

OR

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

18. Find all zeroes of the polynomial $f(x) = 2x^4 -3x^3 -3x^2 +6x -2$, if two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

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19. Prove the following: $\dfrac{\cos\left(90^0-\theta\right)\sec\left(90^0-\theta\right)\tan\theta}{\cos ec\left(90^0-\theta\right)\sin\left(90^0-\theta\right)\cot\left(90^0-\theta\right)}+\dfrac{\tan\left(90^0-\theta\right)}{\cot\theta}=2$

<div align="center">OR</div>

In $\triangle PQR$, right angled at Q, PR + QR = 25 cm and PQ = 5 cm. Determine the values of sin P, cos P and tan P

20. 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

21. In Figure, OACB is a quadrant of a circle with centre O and radius 3.5 cm. If OD = 2 cm, find the area of the (i) quadrant OACB, (ii) shaded region.
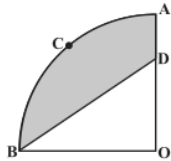
22. A survey conducted on 20 households in a locality by a group of students resulted in the following frequency table for the number of family members in a household:

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.

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

23. In a class test, the sum of Shefali's marks in Mathematics and English is 30. Had she got 2 marks more in Mathematics and 3 marks less in English, the product of their marks would have been 210. Find her marks in the two subjects.

<div align="center">OR</div>

If (-5) is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p\left(x^2 + x\right) + k = 0$ has equal roots, then find the value of p and k.

24. If the sum of first 7 terms of an AP is 49 and that of 17 terms is 289, find the sum of first n terms.

25. Prove that: $\sqrt{\dfrac{1+sin\theta}{1-sin\theta}} + \sqrt{\dfrac{1-sin\theta}{1+sin\theta}} = 2\ sec\theta$.

26. Construct a triangle with sides 5 cm, 6 cm and 7 cm and then another triangle whose sides are 7/5 of the corresponding sides of the first triangle. Write the steps of construction.

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27. A TV tower stands vertically on a bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60°. From another point 20 m away from this point on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is 30° . Find the height of the tower and the width of the canal.

28. If the median of the following data is 32.5, find the missing frequencies

Class interval : 0 – 10 10 – 20   20 – 30 30 – 40 40 – 50   50 – 60   60 – 70   Total

Frequency :	f_1	5	9	12	f_2	3	2	40

OR

The mean of the following distribution is 27, find the value of p

Class :	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency :	8	p	12	13	10

29. D and E are points on the sides CA and CB respectively of a triangle ABC right angled at C. Prove that $AE^2 + BD^2 = AB^2 + DE^2$.

OR

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

30. A metallic bucket, open at the top, of height 24 cm is in the form of the frustum of a cone, the radii of whose lower and upper circular ends are 7 cm and 14 cm respectively, find:

(i) the volume of water which can completely fill the bucket.

(ii) the area of the metal sheet used to make the bucket. [use $\pi = \frac{22}{7}$].

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