# 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. Determine the nature of the roots of the following: $3x^2 - 4x + 3 = 0$

2. Can two number have 15 as their HCF and 175 as their LCM? Give reasons.

3. Find the $10^{th}$ term from the end of the AP : 2, 7, 12, . . .

4. State Basic proportionality Theorem.

5. Find the length of the line AB formed by joining two points A*(acosθ, 0)* and B*(0, asinθ)*.

6. Evaluate: sin 25° cos 65° + cos 25° sin 65°.

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

7. A child has a die whose six faces shows as given below:



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

8. Given that HCF (306, 657) = 9, find LCM (306, 657).

9. An AP consists of 50 terms of which $3^{rd}$ term is 12 and the last term is 106. Find the $29^{th}$ term.

10. Find the area of the triangle formed by the points P(–1.5, 3), Q(6, –2) and R(–3, 4).

11. Ritu can row downstream 20 km in 2 hours, and upstream 4 km in 2 hours. Find her speed of rowing in still water and the speed of the current.

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12. 12 defective pens are accidentally mixed with 132 good ones. It is not possible to just look at a pen and tell whether or not it is defective. One pen is taken out at random from this lot. Determine the probability that the pen taken out is a good one.

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

13. Show that any positive odd integer is of the form 6 $q$ + 1, or 6$q$ + 3, or 6$q$ + 5, where $q$ is some integer.

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

15. If the point (x, y) is equidistant from the points (a+b, b-a) and (a-b, a+b), prove that bx = ay.

**OR**

Point $M(11, y)$ lies on the line segment joining the points $P(15, 5), Q(9, 20)$. Find the ratio in which point M divides the line segment $PQ$ and also find the value of $'y'$.

16. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm$^2$.

**OR**

A juice seller was serving his customers using glasses as shown in Fig.7. The inner diameter of the cylindrical glass was 5 cm, but the bottom of the glass had a hemispherical raised portion which reduced the capacity of the glass. If the height of a glass was 10 cm, find the apparent capacity of the glass and its actual capacity. (Use π = 3.14.)

17. In an equilateral triangle ABC, D is a point on side BC such that $BD = \frac{1}{3}BC$. Prove that: 9AD$^2$ = 7AB$^2$.

**OR**

D, E and F are respectively the mid-points of sides AB, BC and CA of Δ ABC. Find the ratio of the areas of Δ DEF and Δ ABC.

18. On dividing x$^3$ – 3x$^2$ + x + 2 by a polynomial g(x), the quotient and remainder were (x – 2) and (–2x + 4), respectively. Find g(x).

19. If sin (A + B) = 1 and $\cos(A - B) = \frac{\sqrt{3}}{2}, 0^0 < A + B \leq 90^0, A > B$ then find A and B.

**OR**

Prove that: $\left(\sin\theta + \cos ec\theta\right)^2 + \left(\cos\theta + \sec\theta\right)^2 = 7 + \tan^2\theta + \cot^2\theta$.

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20. Solve the following graphically and find the co-ordinates of the points where the lines meet the axis denoted: 2x-5y+4 =0, 2x +y -8 =0 ( x-axis)

21. Find the area of the segment AYB shown in figure, if radius of the circle is 21 cm and $\angle AOB = 120^0$. (use $\pi = \dfrac{22}{7}$).
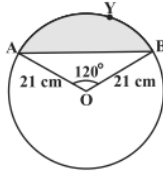


22. The following data gives the information on the observed lifetimes (in hours) of 225 electrical components

| Lifetimes (in hours): | 0 – 20 | 20 – 40 | 40 – 60 | 60 – 80 | 80 – 100 | 100 – 120 |
|---|---|---|---|---|---|---|
| No. of components : | 10 | 35 | 52 | 61 | 38 | 29 |

Determine the modal lifetimes of the components.

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

23. Solve for $x : 3\left(\dfrac{7x+1}{5x-3}\right) - 4\left(\dfrac{5x-3}{7x+1}\right) = 11;\ x \ne \dfrac{3}{5}, -\dfrac{1}{7}$.

**OR**

The denominator of a fraction exceeds its numerator by 3. If one is added to both numerator and denominator, the difference between the new and the original fraction is 1/24. Find the original fraction.

24. How many terms of the A.P. 63, 60, 57,… must be taken so that their sum is 693. Explain the double answer?

25. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then prove that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$

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.

27. From a point P on the ground the angle of elevation of the top of a 10 m tall building is 30°. A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is 45°. Find the length of the flagstaff and the distance of the building from the point P.(Take $\sqrt{3} = 1.732$)

28. In an equilateral triangle, prove that three times the square of one side is equal to four times the square of one of its altitudes.

**OR**

E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that ΔABE ~ ΔCFB.

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29. The lengths of 40 leaves of a plant are measured correct to the nearest millimeter, and the data obtained is represented in the following table

Length (in mm) : 118 – 126   127 – 135   136 – 144   145 – 153   154 –162   163 –171   172 – 180

No. of leaves         3            5            9            12            5            4            2

Find the mean length of leaf.

**OR**

If the median of the following frequency distribution is 28.5 find the missing frequencies

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

Frequency :       5         $f_1$         20          15          $f_2$          5           60

30. A container, opened from the top and made up of a metal sheet, is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm, respectively. Find the cost of the milk which can completely fill the container, at the rate of Rs 20 per litre. Also find the cost of metal sheet used to make the container, if it costs Rs 8 per 100 cm$^2$. (Take π = 3.14).

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