

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: $x^2 - 4x + 4 = 0$.
2. If $\frac{129}{2000} = \frac{129}{2^m \times 5^n}$, then find the values of m and n .
3. Write the next term of the $\sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$.
4. In a $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$.
If $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, find the value of x .
5. Find a relation between x and y such that the point (x, y) is equidistant from the point $(3, 6)$ and $(-3, 4)$.
6. Write the value of $\cos 1^\circ \cos 2^\circ \cos 3^\circ \dots \cos 179^\circ \cos 180^\circ$.

Section B

(Question numbers 7 to 12 carry 2 marks each)

7. A letter is chosen at random from the letters of the word 'ASSASSINATION'. Find the probability that the letter chosen is a (i) vowel (ii) consonant.
8. Explain why $7 \times 11 \times 13 + 13$ are composite numbers.
9. How many three-digit numbers are divisible by 7?
10. Show that the points $(1, 7)$, $(4, 2)$, $(-1, -1)$ and $(-4, 4)$ are the vertices of a square.

11. A carton consists of 100 shirts of which 88 are good, 8 have minor defects and 4 have major defects. Jimmy, a trader, will only accept the shirts which are good, but Sujatha, another trader, will only reject the shirts which have major defects. One shirt is drawn at random from the carton. What is the probability that: (i) it is acceptable to Jimmy? (ii) it is acceptable to Sujatha?
12. Solve for x and y : $29x + 41y = 169$, $41x + 29y = 181$.

Section C

(Question numbers 13 to 22 carry 3 marks each)

13. Use Euclid's division lemma to show that the square of any positive integer is either of the form $3m$ or $3m + 1$ for some integer m .
14. Two tangents TP and TQ are drawn to a circle with centre O from an external T. Prove that $\angle PTQ = 2\angle OPQ$
15. We know that a median of a triangle divides it into two triangles of equal areas. Verify this result for ΔABC whose vertices are A(4, -6), B(3, -2) and C(5, 2).

OR

Find the ratio in which the y-axis divides the line segment joining the points (5, -6) and (-1, -4). Also find the point of intersection.

16. A 20 m deep well with diameter 7 m is dug and the earth from digging is evenly spread out to form a platform 22 m by 14 m. Find the height of the platform.

OR

A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs 500 per m^2 . (Note that the base of the tent will not be covered with canvas.)

17. State and prove Basic Proportionality theorem.

OR

State and prove converse of Pythagoras theorem.

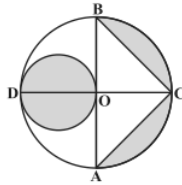
18. Divide $3x^2 - x^3 - 3x + 5$ by $(x - 1 - x^2)$ and verify the division algorithm.

19. Prove that: $\frac{\sin \theta - \cos \theta + 1}{\sin \theta + \cos \theta - 1} = \sec \theta + \tan \theta$.

OR

If $x = \tan A + \sin A$ and $y = \tan A - \sin A$, then prove that: $\left(\frac{x+y}{x-y}\right)^2 - \left(\frac{x+y}{2}\right)^2 = 1$.

20. 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work, and also that taken by 1 man alone.
21. In figure, AB and CD are two diameters of a circle (with centre O) perpendicular to each other and OD is the diameter of the smaller circle. If OA = 7 cm, find the area of the shaded region.



22. During the medical check-up of 35 students of a class, their weights were recorded as follows

Weight (in kg)	Number of students
Less than 38	0
Less than 40	3
Less than 42	5
Less than 44	9
Less than 46	14
Less than 48	28
Less than 50	32
Less than 52	35

Draw a less than type ogive for the given data. Hence, obtain the median weight from the graph..

Section D

(Question numbers 23 to 30 carry 4 marks each)

23. Solve for x : $\frac{1}{a} + \frac{1}{b} + \frac{1}{x} = \frac{1}{a+b+x}$; $a \neq 0, b \neq 0, x \neq 0$.

OR

A pole has to be erected at a point on the boundary of a circular park of diameter 13 metres in such a way that the differences of its distances from two diametrically opposite fixed gates A and B on the boundary are 7 metres. Is it possible to do so? If yes, at what distances from the two gates should the pole be erected?

24. A sum of Rs 700 is to be used to give seven cash prizes to students of a school for their overall academic performance. If each prize is Rs 20 less than its preceding prize, find the value of each of the prizes.

25. Evaluate:
$$\frac{(\tan 60)^2 + 4 \cos^2 45 + 4 \operatorname{cosec}^2 60 + 2 \cos^2 90}{2 \operatorname{cosec} 30 + 3 \sec 60 - \frac{7}{3} \cot^2 30}$$
.

26. Draw a pair of tangents to a circle of radius 5 cm which are inclined to each other at an angle of 60° .

27. Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° , respectively. Find the height of the poles and the distances of the point from the poles.

28. The mean of the following frequency distribution is 62.8 and the sum of all the frequencies is 50. Compute the missing frequency f_1 and f_2

Class interval : (x_i)	0-20	20-40	40-60	60-80	80-100	100-120
Frequency : (f_i)	5	f_1	10	f_2	7	8

OR

Calculate the missing frequency from the following distribution, it being given that the median of the distribution is 24

Age in years :	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No. of persons :	5	25	?	18	7

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

OR

If CD and GH (D and H lie on AB and FE) are respectively bisectors of $\angle ACB$ and $\angle EGF$ and $\triangle ABC \sim \triangle FEG$, prove that

(i) $\triangle DCA \sim \triangle HGF$ (ii) $\frac{CD}{GH} = \frac{AC}{FG}$ (iii) $\triangle DCB \sim \triangle HGE$.

30. A hollow cone is cut by a plane parallel to the base and the upper portion is removed. If the curved surface of the remainder is $\frac{24}{25}$ of the curved surface of the whole cone, find the ratio of the line-segment into which the cone's altitude is divided by the plane.

*****XXX*****